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The INDUSTRIAL-ARTS MAGAZINE

MARCH-1923

THE-BRUCE-PUBLISHING-COMPANY
MILWAUKEE-WISCONSIN

ATKINS
SILVER STEEL SAWS

IN ATKINS SAWS YOU GET REAL TAPER GRINDING— NOT AN IMITATION

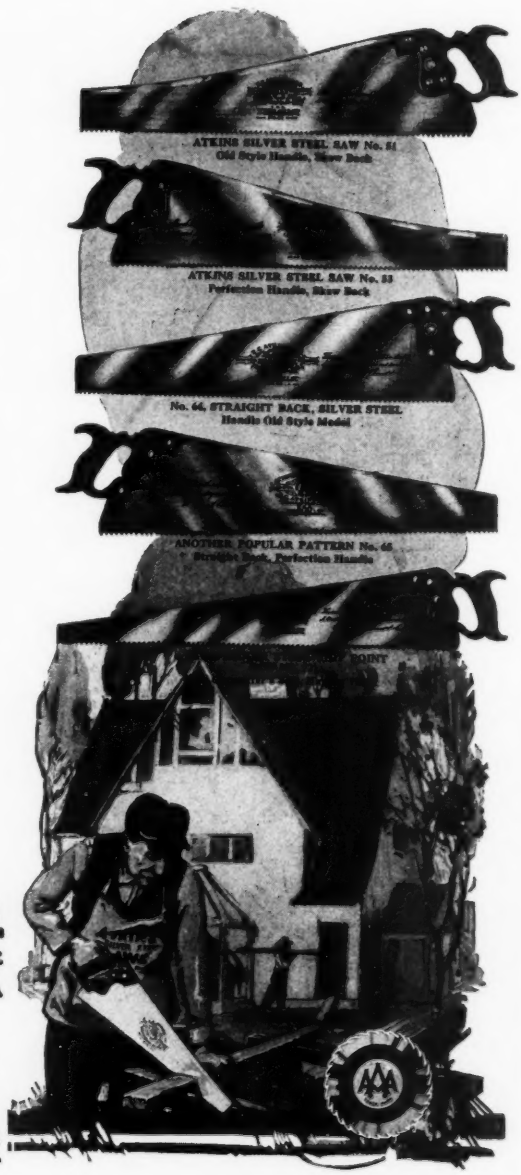
When a saw "binds" it's the fault of the saw, not the sawyer; except, of course, the sawyer was to blame for buying the wrong saw.

ATKINS Silver Steel SAWS

are ground to a taper, from the teeth to the back, then tapering on the radius of a circle; the thickest part is at the handle and tapering to the point, the thinnest part. In other words, the taper is from teeth to back and from heel to point. That's what makes Atkins Saws cut free and easy.

We furnish them in regular or ship point widths, straight or skew back, equipped with old style block handle or the latest and most scientific handle—the handle that eliminates wrist strain—the Improved Perfection.

FREE—Write for "Saw Sense," the book of facts, also educational literature, "How To Care For And Use Cross Cut and Hand Saws," for use of your classes.


ATKINS SILVER STEEL SAW No. 51
Old Style Handle, Skew Back
ATKINS SILVER STEEL SAW No. 53
Perfection Handle, Skew Back
No. 44, STRAIGHT BACK, SILVER STEEL
Handle Old Style Model
ANOTHER POPULAR PATTERN No. 45
Straight Back, Perfection Handle
POINT

E.C. ATKINS & CO.

ESTABLISHED 1857 THE SILVER STEEL SAW PEOPLE

Home Office and Factory, INDIANAPOLIS, INDIANA

Canadian Factory, Hamilton Ontario
Machine Knife Factory, Lancaster N.Y.

Branches Carrying Complete Stocks In The Following Cities:

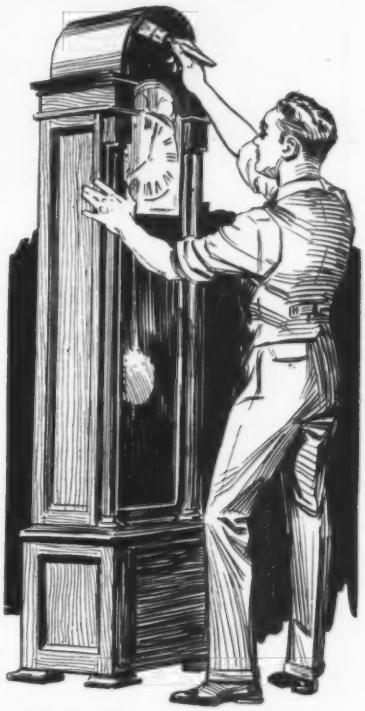
Atlanta	New Orleans	Seattle
Memphis	New York City	Paris, France
Chicago	Portland, Ore.	Sydney, N. S.W.
Minneapolis	San Francisco	Vancouver, B.C.

Choosing the Proper Finish Is Important

Johnson's Artistic Wood Finishes are now being used in nine-tenths of the schools in United States and Canada. They are particularly adapted for manual training work as they may be applied by the youngest and most inexperienced pupils with good results.

JOHNSON'S *ARTISTIC* WOOD FINISHES

The finishes more popular among Training Instructors and Pupils are: Johnson's Wood Dye, Prepared Wax, Under Lac, Paste Wood Filler, Varnishes, Undercoat and Enamel. Enamel.



The finishing of manual training models is assuming more and more importance every year. Surely it is a subject which should be given its share of attention, for a beautiful model may be ruined if improperly finished, whereas the defects of a poorly constructed model are minimized if well finished.

Johnson's Artistic Wood Finishes are very easy to use. Boys in the Fifth and Sixth grades can use them successfully. Simple instructions are printed on every label.

FREE—Book on Wood Finishing

Our Book is a valuable text book on Wood Finishing and should be in the hands of every instructor of Industrial and Vocational Education. It is full of information on finishing all wood — hard or soft — old or new. Tells how inexpensive soft wood, such as pine, cypress, fir, etc., can be finished so they are beautiful as hardwood.

This Book is the work of experts—profusely illustrated in color—includes color charts—gives covering capacities, etc. New edition is just off the press. We will gladly send it free and postpaid. Fill out and mail coupon below.

Submit Your Problems to Our Individual Service Department

We have a very attractive exhibit of wood panels finished with these products which we are glad to send, free and postpaid, to Manual Training Instructors who will give it wall space in their shops.

At all times we are glad to furnish Manual Training Instructors with specially finished panels of wood for class room use, also with working samples. There is no obligation whatever connected with this offer. Don't hesitate to avail yourself of it.

S. C. JOHNSON & SON, Dept. I.A.-3, RACINE, WIS. (Canadian Factory—Brantford).

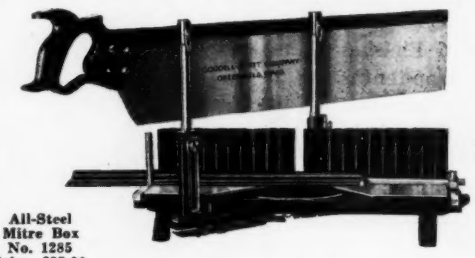
Please send me free and postpaid your text book on Wood Finishing. We usually buy finishing materials from

Dealer .....

My Name.....

My Address.....

City and State.....



All-Steel
Mitre Box
No. 1285
Price, $25.00

To make teaching easier

It is a wise policy to train students with the same tools they will choose themselves when, later, they will be out of school, working at a trade.

To help you train students correctly is the job of this Goodell-Pratt Mitre Box. The Only all-steel mitre box made. Trussed like a steel bridge.

Makes a clean, smooth cut at any angle between 45° and 90°—right or left. An extra angle attachment enables the workman to saw at more acute angles. All angles are indicated on a graduated arc.

This mitre box is equipped with a high-grade Back Saw. The saw can be locked at any angle and is held by a spring which is released by a slight downward pressure of the hand.

The steel bottom plates are scored to keep the work from slipping, and the stops can be regulated to saw to any desired depth.

Mr. Punch Says

"When I see a good mitre box being used I know that the students are being trained to use and appreciate good tools."

1499 other good tools

No matter what kind of shop work your curriculum calls for, there is a Goodell-Pratt Tool made to do that work quickly and right.

Write today for complete details of this All-Steel Mitre Box and whatever other tools your school may be interested in. Our free Catalog No. 14 shows "1500 Good Tools." Write for it.

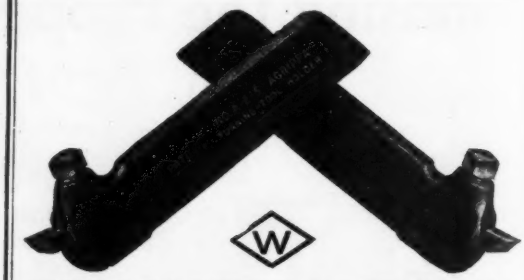
GOODELL-PRATT COMPANY

Toolsmiths

Greenfield, Mass., U. S. A.

GOODELL-PRATT

1500 GOOD TOOLS



WILLIAMS' "*AGRIPPA*" TOOL HOLDERS

"THE HOLDERS THAT HOLD"

for

Turning Boring Planing
Threading Knurling
Cutting-Off and Side Work

Literature on request.

J. H. WILLIAMS & CO.

"The Drop-Forging People"

BROOKLYN
157 Richards St.

BUFFALO
157 Vulcan St.
St. Catharines, Ontario

CHICAGO
1157 W. 120 St.

MAYDOLE HAMMERS

THE WORLD'S STANDARD

There are none better made—none better known. When you buy these hammers, you are certain of getting the best. They are used the world over.

Maydole Hammers are made of finest quality material, and guaranteed first-class in every respect.

Write for our booklet of useful information, which every student should have. How many shall we send?

The David Maydole Hammer Company

NORWICH NEW YORK U. S. A.

A splendid carving tool set to start with —and to keep on with

Millers Falls Carving Tool Set No. 3 has tutored many an ambitious young mechanic, and helped him to get the hang of things.

Likewise it boasts many a lifelong friend among master workmen of the gouge and chisel.

This high quality set is made especially for manual training school use. It contains the following 12 tools:

"U" tool	Small circular gouge	Curved gouge
Veining tool	Small flat gouge	Large circular gouge
Narrow bevel chisel	Bent chisel	Large flat gouge
Narrow chisel	"V" tool	Wide chisel

Clips hold each tool firmly in place.

Forged steel blades, with keen cutting edges. Polished cocobolo handles. Polished and nickel-plated ferrules. Packed in hinged hardwood box.

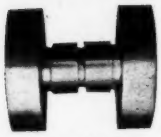
Length of tools, except matting tool, average 8½ inches.

Instructors of Manual Training: Write us your needs.

MILLERS FALLS COMPANY
MILLERS FALLS, MASS.

Manufacturers of Carpenters' Tools, Hack Saws and Automobile Tools.

THE JOHNSON FRICTION CLUTCH



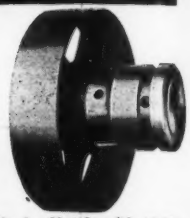
Double Clutch with Pulleys

FOR SCHOOLS

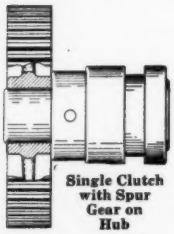
Cut the Cost of Power Transmission by Using JOHNSON CLUTCHES in Your Manual Training Department

AS ILLUSTRATED

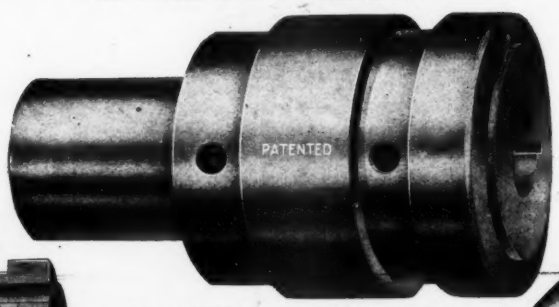
"BE SURE IT'S A JOHNSON"



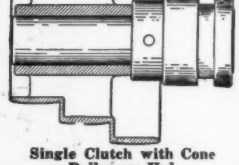
Single Clutch with Pulley



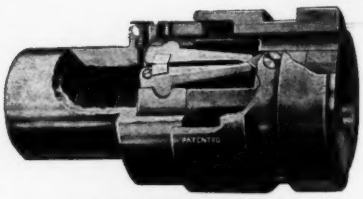
Single Clutch with Spur Gear on Hub



THE JOHNSON SINGLE CLUTCH



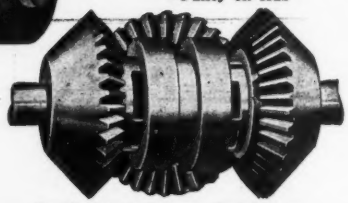
Single Clutch with Cone Pulley on Hub



Single Clutch Broken Away

MEMO FOR YOUR STENOGRAPHER

Please write the Carlyle Johnson Machine Co., Manchester, Conn., as follows:
Please send Catalog "IAM" and Clutch Information Blank of small, compact friction clutches.



Double Clutch Between Bevel Gears

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

TRADE MARK

"STAR"
Hack Saws

Want the Best?

TRY IT

CLEMSON BROS., Inc.
MIDDLETOWN, N. Y.
Makers Since 1883

Established 1847 — Incorporated 1878

Woodworking Machinery

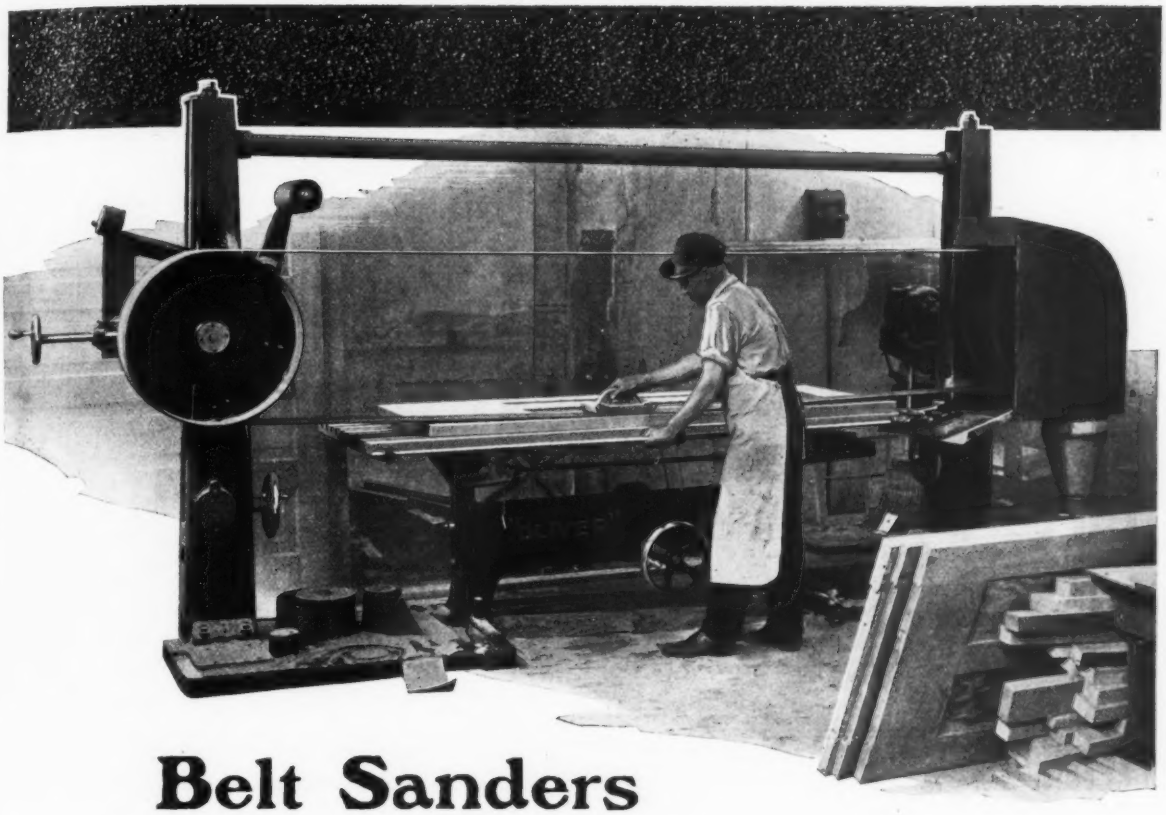
New No. 338-B
VARIETY SAW BENCH
With Tilting Table

The Machine is equipped with Cross-Cutting and Slotting Gauges, and Safety Guards. Driven by Belt or Motor.

ADDRESS

H. B. Smith Machine Co.

Smithville, N. J., U. S. A.
Or Nearest Branch
NEW YORK CHICAGO ATLANTA SAN FRANCISCO



Belt Sanders

Photograph was taken at the Benj. F. Edge Interior Finish Factory, Grand Rapids, Mich., where they are turning out their sash, doors and other products faster and better because of the installation of this "Oliver" No. 183 Belt Sander.

There is an "Oliver" Belt Sander that will speed up your production and improve your product whether you make interior trim, furniture, cabinets, musical instruments or any woodwork requiring sanding and polishing.

"Oliver" Belt Sanders are built in four types, several of which are well suited to school shop use, and have such advantages as self-contained table, direct motor drive, ball bearings, reversible belt, capacity to sand flat pieces or desks, or even high bookcases.

If you wish to teach modern methods you must have modern machinery.

Write for details of this "Oliver" 15-inch Disk Sander. It is portable and operates from lamp socket.

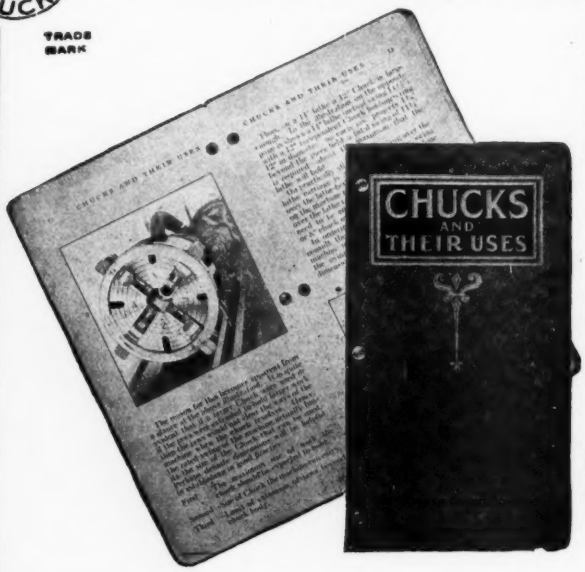
Oliver Machinery Company

GRAND RAPIDS, MICH., U. S. A.

SKINNER CHUCKS

TRADE MARK

FOR BETTER CHUCK SERVICE



We have manufactured chucks for thirty-odd years and during this time have naturally acquired much data and information not in the possession of chuck users generally. We felt that this information, placed for ready reference in the hands of those interested in chucks, would help them to secure the fullest measure of service from their chucks. Therefore, we have just published a conveniently sized handbook entitled

"CHUCKS AND THEIR USES"

Valuable to Vocational Directors and Students.

Those interested will receive a copy of this book without charge. It includes:—

A history of chucks, and their development—
A full description in everyday language of the different types of standard chucks—
Suggestions for the proper care of chucks—
Best methods of fitting chucks to lathes—
Suggestions for general shop practice.

A number of these books, distributed among the students in your school shops, should prove of value. A copy will be sent free upon request to anyone giving personal name and occupation.

Write for your copies now. No charge.

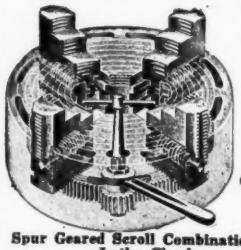
THE SKINNER CHUCK COMPANY

NEW BRITAIN, CONN. U.S.A.
ESTABLISHED 1887

DURABILITY — ACCURACY — STRENGTH

are striking features of

Westcott Chucks



Spur Geared Scroll Combination Lathe Chuck

They are as essential in the schoolroom as in the commercial shop. The student who learns his trade using the very best of tools and equipment, is sure to benefit in the end.

In the case of chucks—
BUY WESTCOTT

Little Giant Double Grip Drill Chuck

Mainly About Your Classes

If you are not using Westcott Chucks now, you should certainly give your boys this advantage. Their best work can only be accomplished on the best equipment. Specify Westcott Chucks on your next order—in the meantime send for our catalogue.

Manufacturers of chucks for every class of work.

WESTCOTT CHUCK COMPANY

Oneida, New York

---

with the LOCKED HANDLE

The patent wedge does it!

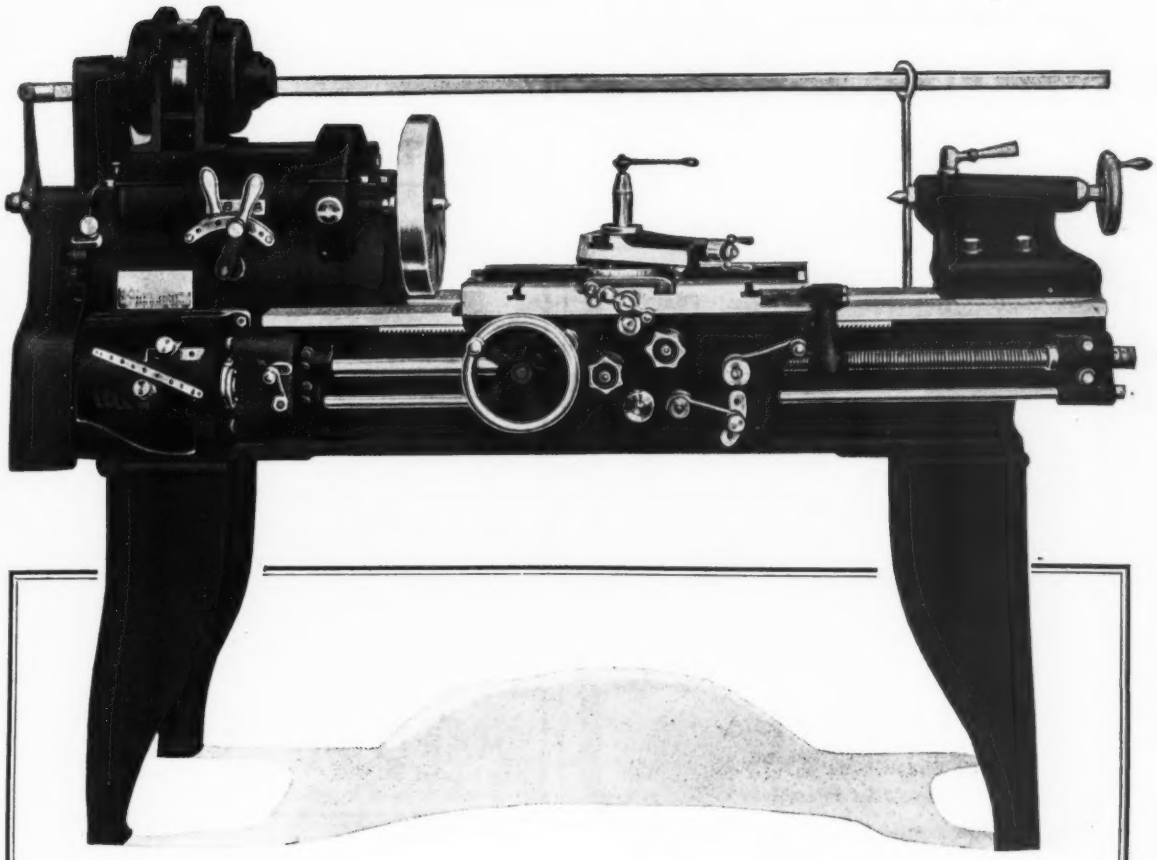
Only on V & B Hammers, and remember, each hammer carries the Underwriters' Laboratories label.

When you buy V & B Hammers, you buy quality plus safety!

VAUGHAN & BUSHNELL MANUFACTURING COMPANY

Makers of Fine Tools

2114 Carroll Ave. Chicago, Ill. U.S.A.

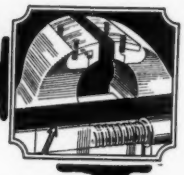


14″x6′ Monarch Motor Driven Lathe. One of the very finest lathes in the world. Hundreds in use in Vocational Schools. Smaller and larger sizes of Monarch Lathes fit every school requirement. Let us submit prices.

The Monarch Machine Tool Co.

304 Oak Street **Sidney, Ohio**

PARKER VISES



Have Steel Ribbed Slides

NOTE the flat strip just above the screw in the phantom view. That is a bar of tough steel strengthening the weakest part of a vise, the slide!

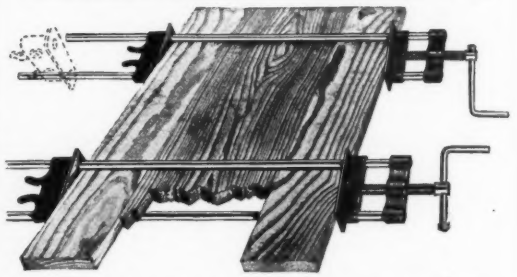
—and Renewable Tool Steel Jaws

Not a mere face jaw, but one that covers the entire top of the vise with steel. Milled to fit and ***pinned on***; not cast or screwed on. Cannot work loose.

Send for Folder showing other Parker Features and Catalog No. 57-A.

THE CHARLES PARKER COMPANY
Master Vise Makers,
Meriden, Conn., U. S. A,
Parker Vises Grip Like a Grizzly

Rigid in the Grip
OF
HARTFORD DOUBLE BAR CLAMPS



The Double Bar feature is shown above in actual operation. That is the way the wood is held when gripped by "HARTFORD" double bar clamps.

YOUR WORK CANNOT BUCKLE.

This clamp is used extensively in Manual Training Schools. Send for catalog No. 10 which contains complete price list on Single and Double Bar Clamps, Hand Screws and "C" Clamps.

HARTFORD CLAMP CO.
308 Pearl St. Hartford, Conn.

WORTH WHILE

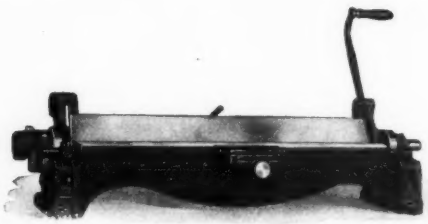
PEXTO

MACHINES AND TOOLS
For
SHEET METAL WORK

If not already equipped, eventually you will join some four hundred progressive schools in voicing favorable expression for what this course offers and how Pexto equipment has helped to make the work a success.

Our Engineering Department is at your service.

THE PECK, STOW & WILCOX CO.
SOUTHINGTON, - CONN.



Keystone Bar Folder

Sheet Metal Working Tools

To secure a finished job, accurate tools are necessary. Use Niagara equipment and you are positive of the quality of that particular job.

Presses, Punches, Squaring Shears, Ring and Circle Shears, Tinners' Tools and Machines.

Send for Catalog

Niagara Machine & Tool Works
Established 1879
BUFFALO, N. Y., U. S. A.

NIAGARA 60197

Lending a Helping Hand in Your Profession

Awards for Every Writer of an Essay

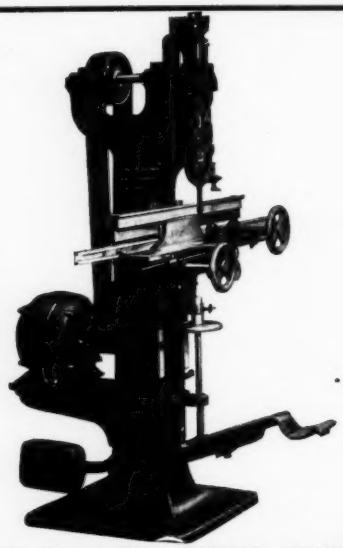
Over ten thousand dollars in cash and valuable prizes to every eligible contestant. Instructors and Directors of vocational training and those directly interested in the development of boys in the woodworking and cabinet making departments have an opportunity to participate in the unusual educational campaign.

We believe that cabinet making is replete with possibilities for character building, for mental and cultural development. We want you to tell us what you think of this idea, what you are doing or propose to do to emphasize the cultural side of cabinet making in the training of your boys.

Every teacher who sends us 500 words or more on this subject will be rewarded for his endeavor. The best thoughts on the subject will be bound in book form and distributed broadly throughout the country. And essays considered worthy of entrance into this book will be awarded special cash prizes according to their merit to be established by a board of Judges, consisting of three men high in the vocational field.

Write today for our booklet "Details of Essay Contest"

EDUCATIONAL DEPARTMENT
AMERICAN WOOD WORKING MACHINERY CO.
ROCHESTER, NEW YORK, U. S. A.



NO. 147 HOLLOW CHISEL MORTISER

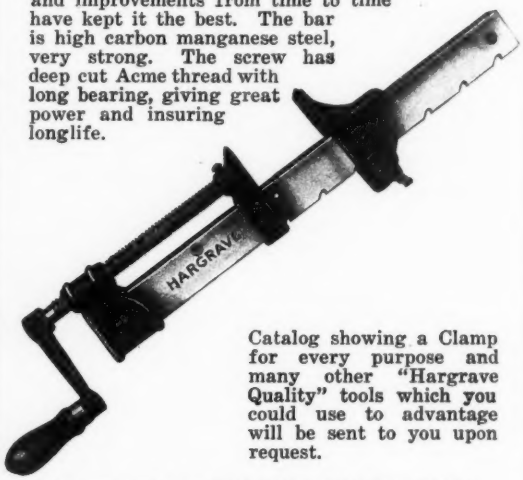
Especially adapted for Manual Training Schools, as it is simple to operate, has new type gauge and will mortise up to ¾". All parts are guarded and is arranged for direct motor drive. We shall be pleased to send complete information and also testimonials regarding this machine. Write for circular today, also copy of our Special Manual Training School Catalogue.

Hall & Brown Wood Working Machine Co.
Home Office and Factory
1913 to 1933 North Broadway
ST. LOUIS, U. S. A.

HARGRAVE

QUALITY TOOLS

Our PERFECTION CLAMP was the first steel bar clamp upon the market and improvements from time to time have kept it the best. The bar is high carbon manganese steel, very strong. The screw has deep cut Acme thread with long bearing, giving great power and insuring long life.



Catalog showing a Clamp for every purpose and many other "Hargrave Quality" tools which you could use to advantage will be sent to you upon request.

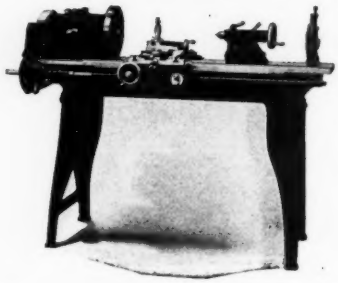
Ask your dealer for "HARGRAVE QUALITY" TOOLS

THE CINCINNATI TOOL CO.

Established 1879 Incorporated 1884
Waverly Ave. and C. L. & N. Ry.
CINCINNATI, OHIO

"Oliver" Engine Lathes

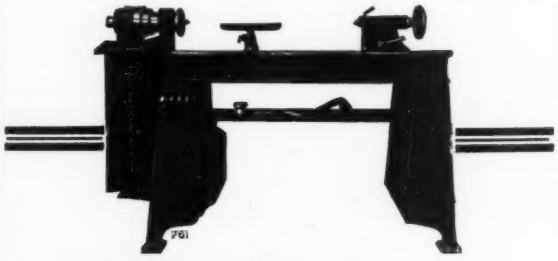
10-12-14-16-18-26-30-inch sizes



"Oliver" Engine Lathes for high duty production, tool making, garage, job shop, experimental laboratory or school shop.

"Oliver" Engine Lathes are built with cone or geared head, belted or motor drive.

OLIVER MACHINERY CO.
Grand Rapids, Mich., U. S. A.



UNUSUAL!—
in its safety features

Although safety is only one of the many fine features incorporated in the "American" High Speed Ball Bearing Lathe and other "American" wood working and manual training machinery, it is the feature that appeals most to superintendents and teachers charged with responsibility for the safety of their classes.

In addition to safety—ruggedness and simplicity of control are also inherent in "American" manual training equipment.

Our catalog should be in your library. Write for it today. It lists and describes the full "American" line, which includes saw benches, jointers, planers, band saws, wood workers and other manual training machinery.

American Saw Mill Machinery Company
74 Main St. Hackettstown, N. J.

AMERICAN
MANUAL TRAINING EQUIPMENT

Wood Finishing Bulletins

Will bring to you authoritative information concerning the latest and best methods of finishing wood.

They explain in detail the advantages of our water stains, the uses of oil and spirit stains, how wood filler is made, etc.

Supplying the makers of the finest furniture in the country for years, as we have, guarantees to you the very highest grade of wood finishing materials that it is possible to produce.

Write us for further information, and ask to have your name entered for the BULLETINS.

Drop us a postal now.

Grand Rapids Wood Finishing Co.
61-71 Ellsworth Ave.,
Grand Rapids, Michigan

MARIETTA WOOD AND METAL FINISH SPECIALISTS

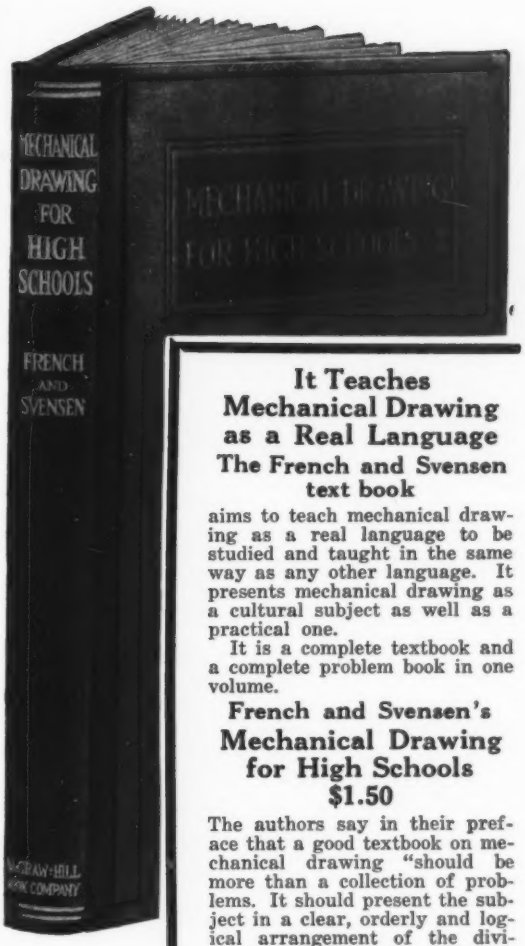
The finish should be your master stroke

MARIETTA SPARTAN ART WORK STAINS

will give the final touch to the product of your hand and brain that insures satisfaction when looking it over or showing it to friends.

The Marietta Paint & Color Co.
Marietta, Ohio

"Save the surface and you save all"—Paint & Varnish



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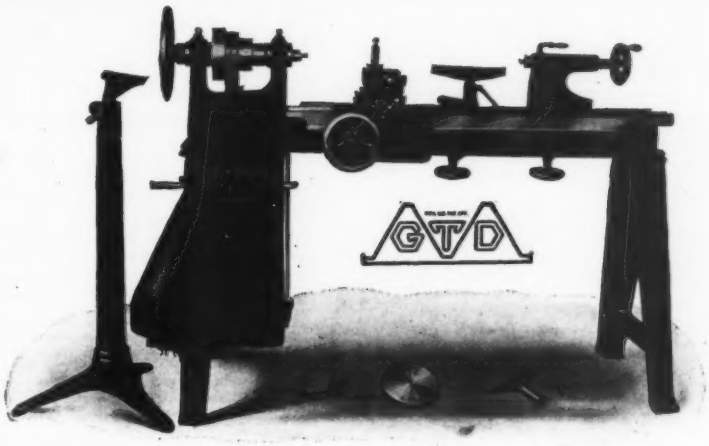

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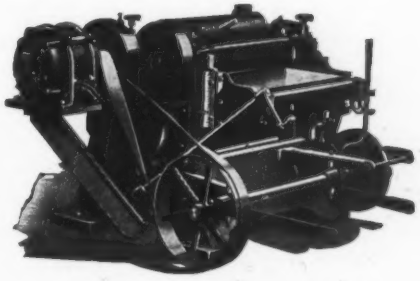

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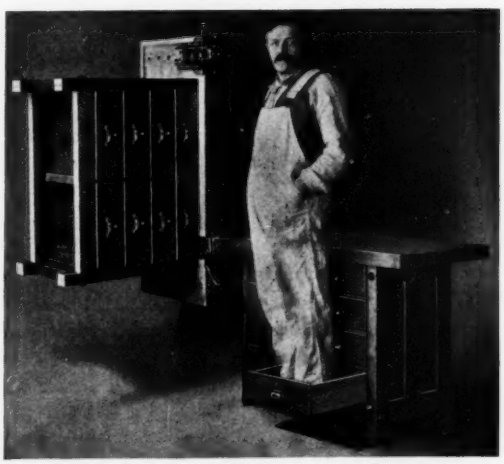

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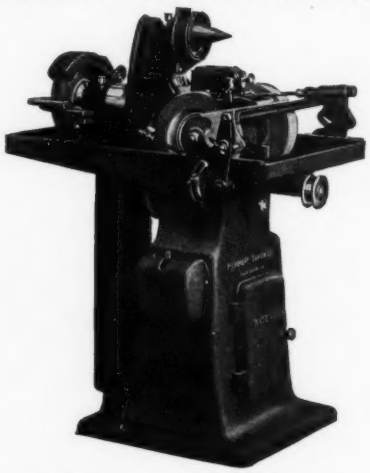

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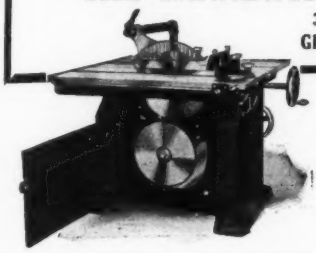

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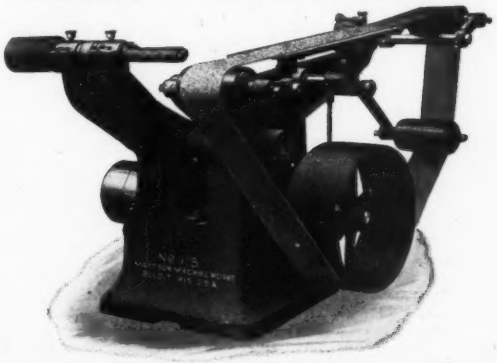

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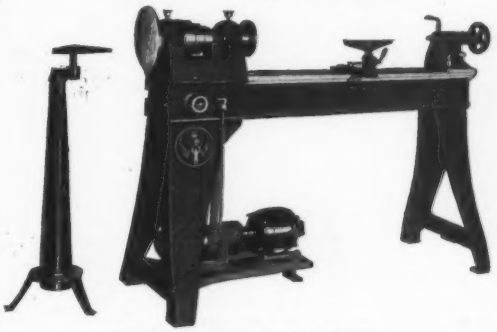

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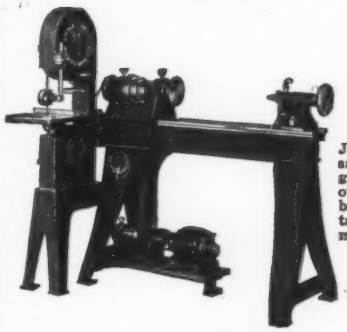

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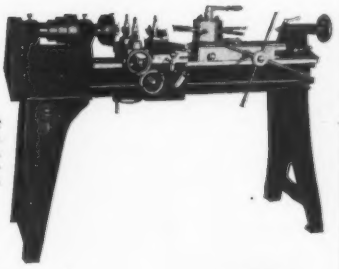

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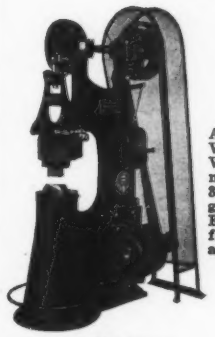

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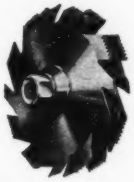

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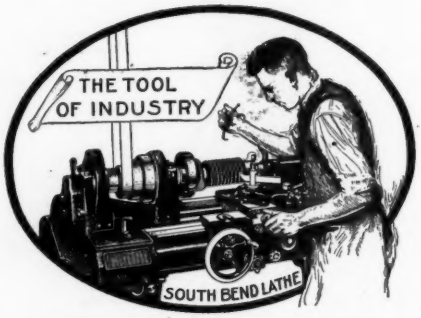

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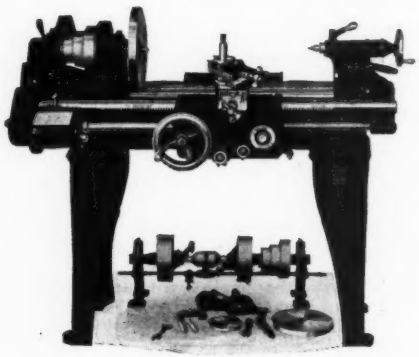

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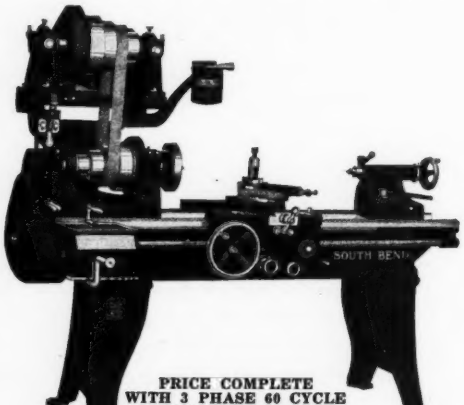

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INDUSTRIAL-ARTS MAGAZINE

Volume XII MARCH, 1923 No. 3

Some Administrative Phases of an Automotive Trades School

Part I. The Short Unit Evening Course

Ray F. Kuns, Cincinnati, O.

AS in the case of many other activities, the existence of the Automotive Trades School dates from the close of the World War. The signing of the Armistice found the Cincinnati board of education with a group of 150 soldiers whom they were training in automobile mechanics and motorcycle care and repair. When these men were mustered out in December the board was left with quite a bit of equipment in the way of motorcycles, passenger cars, trucks, engines, and other equipment.

On December 28, 1918, the school was opened to the public, offering work in day and evening instruction. In this article we shall discuss some of the problems of organization of the evening school instruction. During the war period the task of obtaining equipment was a difficult one. This was true both with reference to the required hand tools and the units of automotive equipment. For this reason we had an over supply of some items and an under supply of others. Then, too, with the haste in the war work no one had thought to keep any record of the items at hand.

The space occupied at that time was 7,000 feet on the third floor of a garage building. This building was of fireproof construction and originally all in one large room. An office had been partitioned off in one corner and a lecture room in another. Otherwise the space was still undivided into departments. This was immaterial so long as but one or two classes were in operation at any one time.

The first group of men enrolling for the work numbered seventeen. These were organized into a class and started to work on chassis theory and construction. Very shortly these men had brought in enough of their friends to warrant another instructor. The first group of men was advanced to engine work and the second group started in on the chassis work. The students continued to advertise the school and a third man was placed on the staff. All classes were crowded, the enrollment for the work at the time of closing for the summer numbering over one hundred men.

The evening school was closed in May, for the summer. The day work, too, had been growing. The need for taking stock of equipment was apparent, as was, too, the need of some method of daily care and inspection of the equipment. Accordingly an inventory was made. This showed that while we were well supplied with tools of certain kinds, there were other and just as essential ones of which we had none. The board had instructed those in charge to operate the school as a trade school. If trade practice was to be taught then the student must be supplied with the necessary tools. As an example in case: If an owner driver wishes to use a hammer to remove a gear or wheel which is pressed on, that is his privilege, but if he comes into a garage and finds a tradesman using that method he will object and rightly. A tradesman should use a gear or wheel puller. With this idea of correct trade practice in mind, tools were ordered to round out our tool room equipment and the necessary amount of machine tool and other equipment especially adapted to the automotive trades was purchased. In judging as to what equipment was needed to properly teach correct trade practice, the better class of garages and repair shops were held in mind. We did not want to teach the use of equipment which would not be found in the repair shops of our city. We found a number of garages equipped with oxy-acetylene welding equipment. Accordingly we installed a portable set of welding equipment. We found the use of the hand forge in making up special tools and in special cases of bending, straightening, etc., to be common practice, so a hand forge was installed. Trade practice did not stipulate down draft power operated forges. It stipulated the old-fashioned kind which wets with sweat the brow of the operator, and makes him appreciate the forging heat when he gets it.

The lathe, drill, and power grinder, as well as the portable electric drill, comprise the most common of the machine tools. An air compressor, too, may be considered standard garage shop equipment. With this item of proper equipment well under way thought was given to the question of proper organization and arrangement of the automotive units used in the actual

ENGINE ROOM, AUTOMOTIVE TRADES SCHOOL, CINCINNATI, O.

teaching process. At the outset the age-old problem presented itself: Should the boy be taught to swim by taking him to the sandy sloping beach where the sun has the water nicely warmed and where he can paddle and splash and flounder in comparative safety and eventually learn to swim? Or should he be taken to the springboard and dropped off into water over his head, trusting that instinct will tell him what to do to save his life? In trade terms, should you set the boy to work learning to file and saw, to hammer and chisel, to use taps and dies, to learn the names and functions of parts, to disassemble and reassemble separate units, or should you set him to work overhauling a car just off the road and expected to be returned to the road in proper condition and safe to be used? To use one specific example: Should a boy who does not know the difference between right and left-hand threads be permitted to adjust the front wheel bearings on a car which is to go into immediate service on the streets and roadways?

One feature of the work planned was caring for the service work on some of the cars belonging to the board of education as well as a certain amount of service work to bring the proper run of work into the shop. The problem was settled by determining on certain work preliminary to sending a boy to the service department. In order to facilitate this preliminary work a floor plan of the available space was made. Room was provided for each of the several items such as chassis work, engine work, electric work and service work. To separate the several departments from each other, wire netting partitions were set up. This enabled the instructors in charge to lock up such equipment as was not in immediate use. The equipment was then carefully gone over and the parts sent to the respective rooms where they were properly mounted or arranged for instruction. The engines were grouped where they could be properly cooled with running water and the exhaust gases carried away. The rear axles, front axles, and other chassis items were grouped on proper racks and stands. The electrical units were mounted on tables and wired up.

When the night classes were opened the following fall three instructors reported for duty. The first night instead of the 105 men who had been with us in our evening classes the previous term, 265 men reported for enrollment. Where a few extra men could have been handled with the former teaching force, it was found impossible to handle the number demanding admission, without either increasing the number of men teaching or the number of nights.

In the long-standing plan of the evening school work of the Cincinnati public schools, classes meet for two nights a week on alternate nights, the one class meeting on Monday and Wednesday evenings and the second class meeting on Tuesday and Thursday evenings for two hours each evening. With the enrollment of the year before and the three teachers we had had enough classes to run each teacher four evenings. With the new enrollment we had enough men enrolled to make up eighteen classes of fifteen students each. Where we had three men to teach we needed nine men to teach and one to supervise. It might not be amiss to say that we were rather unprepared for such an enrollment. We had no proper enrollment card. We had no place to assemble the men to give them the needed instruction. Every aisle was filled. The two classrooms were filled, the little office was filled and every other nook

THE BATTERY ROOM, AUTOMOTIVE TRADES SCHOOL, CINCINNATI.

and cranny was filled with men, asking for information about the work offered and seeking to be enrolled.

Slips of paper were passed to the men and they were asked to give us certain information on them. Our present enrollment form or card is one of the results of that evening's experience. Needless to say the information we gathered on the blank slips of paper was incomplete and ofttimes incorrect. We did the best we could with the men and asked them to return to their homes, promising to notify them when to report at school for work. Another thing growing out of our experiences that evening was our notification system.

With reference to the enrollment, a few statements further will show the reader how the need for real organization was made apparent. Going over the slips filled out by the applicants, it was found that they came from every walk of life. They had a great variety of qualifications and wanted to secure instruction in practically every phase of the automotive trades. This first group of men was representative of each succeeding group of men. With a proper enrollment card it has been learned that the evening school students come from practically every trade and every profession. Their previous schooling ranges from three or four years up to sixteen or eighteen. They range from laborers and factory workers to graduate engineers and judges. The large bulk of them, of course, come from the automotive trades and closely allied ones, such as the machine tool trades.

At first no attempt was made to divide the men, but later the local authorities in cooperation with the state and federal vocational education officials decided on a division. This was consequently effected along the line of the provisions of the Smith-Hughes law. Only men qualifying as automotive trades tradesmen are admitted to those classes designated as state and federal-aided classes, while anyone not so qualifying may be admitted to the other classes, the expense for which is met entirely by the local school board.

As stated previously, the need for thorough organization was apparent. The contexture of the automobile and the automotive trades must be analyzed and broken up into such units as would permit of instruction being given in any one, without reference to whether or not certain other ones had been studied previously. In selecting teachers an effort was made to select men from the trades who were experts in some particular line. That is, instead of trying to select men who were equally trained in all phases of the work, an attempt was made to find men with training and understanding of the whole field but really expert in some one phase. For instance, a man who was an expert on rear axle work need not be an equally good man on the engine work. An engine man was expected to be thoroughly versed on engines but might not be rated as an expert on electrical work. While the electrical instructor must know batteries, the teaching of battery tests, care, and repair was to be left to the battery man.

Another item entering in here was that of organizing each phase of the work so that it might be covered in an equal amount of time. During this second term several methods of division and varying lengths of time were tried. The short unit was set for four weeks which meant eight lessons of two hours each. After running for several units it was learned that the time was just a little bit too short, so another week was added. This is the scheme in use at present. Any one course or short unit requires five weeks, ten lessons or twenty hours to complete. At one time it seemed advisable to double the length of time required to cover the electrical work as compared to the other units. This did not prove a success. Consequently the electrical work was broken

up into several parts, each presented as a complete unit. Another matter which did not prove successful was holding the meeting of any one class on alternate nights. This led to confusion in the use of the equipment. Accordingly each class was asked to report on succeeding evenings. This allowed the instructor to give his lecture the first part of the first evening and then place the men on the practical work, for the rest of that session. When they returned the next evening they proceeded with the work in hand and by the close of the session, the equipment was usually restored to its original assembled condition, which left it in proper preparation for the class the following evening.

If the reader will now turn to the illustration of the enrollment card some explanation of it will be given. In the first place it will be noted that there is a separate space blocked off for each item desired when enrolling a new student. A great deal of trouble was at first experienced in such small items as first and last names and city and street addresses. At present this is seldom experienced. Care is used in learning the students' home town as this determines whether or not he pays a tuition fee. As to occupation, it is always desirable to know if a man is working in certain phases of certain trades. Places of occupation (names of the company) are never accepted nor required. A man is a lathe hand, a shoe worker, a chauffeur, an automobile mechanic, a battery repair man, a bank clerk or what not. This is of aid in properly placing the student in the classes. Along with this information enough details are secured to permit of properly rating the student as a "tradesman," "beginning tradesman" or "owner driver."

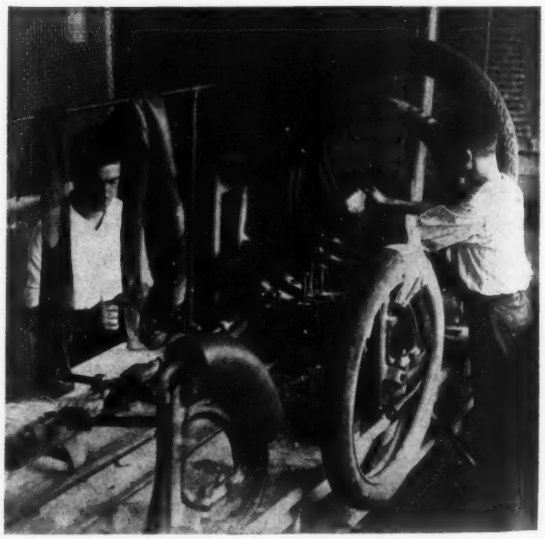
To qualify as a tradesman the student must be actively engaged in the automotive trades in the day. A beginning tradesman is a man who wants to learn enough of the trade to enter it. He may be a journeyman worker in some other trade but in the automotive trades he is a beginner. The owner driver group is not large and requires no particular explanation. When a student is enrolled he is asked to "select" three or four units. He may select—provided he is qualified—any one of the fifteen units as his first choice. In the column marked "selected" he places the figure 1 under his first choice, 2 under his second choice, 3 under his third choice, and so on. When assigning students to class the practice is to give as nearly as possible these courses or units of work in the order selected. If the reader will make an inspection of the evening school record card he will see about how this works out.

To prevent loss of time in the change of classes a system has been worked out for notifying men of their assignment for succeeding units of work. For instance, a student will leave the school at the end of one unit not knowing which unit he will attend the next time he reports. All cards are sent to the principal's desk at the end of each unit. Those cards representing men who have no further choice—men withdrawing—are first removed. The remaining cards are then arranged in classes according to the information found on each card; that is, each man represented is given his next choice of work. However, it may be found that some classes are too large and others are too small. The classes which are too large are then gone over and those cards withdrawn which can be placed in one of the smaller classes. This means, of course, that some men are getting their third or fourth choice first, but it does not make any difference to the men in the end, since most of them want to take at least four or five units of work. Five units constitute a winter's work, and it is seldom that any man cannot get the unit he most desires at some time during the year.

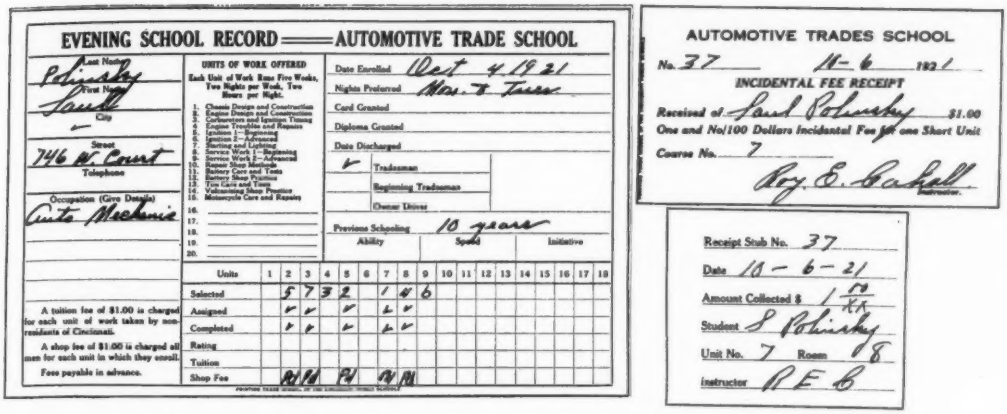
After the classes are made up, which is not later than Thursday evening or Friday noon, a postal is sent each man, notifying him of his assignment for the ensuing five weeks. A few are usually displeased. These are asked to report to the office where the trouble is usually adjusted to their satisfaction. The main groups of men, however, find their way to their new class, their new room and their new instructor without trouble and the work goes ahead without loss of time.

The tendency with evening classes on the part of most instructors seems to be to give too much lecture work. As mentioned previously in this article, the first part of the first night for each class each week is used for lecture work. The second part of this same night is used for practical work. On the opening of the class on the second night, the men take hold of their work where they left off the first night, and carry it on to its conclusion, if that is possible. This is the feature which permits the use of the same equipment by the two groups of men. It is true, of course, that there are variations from this general plan. The general idea, however, has been found a satisfactory arrangement.

The maintenance of equipment has proven one of the greatest difficulties in administering the school economically, as far as the board was concerned, and



A CORNER OF THE TIRE REPAIR SHOP.



EVENING SCHOOL RECORD ——— AUTOMOTIVE TRADE SCHOOL

Last Name: Polinsky
First Name: Saul
City:
Street: 746 W. Court
Telephone:
Occupation (Give Details): Auto Mechanic

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A shop fee of $1.00 is charged all men for each unit in which they enroll.
Fees payable in advance.

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Each Unit of Work Runs Five Weeks, Two Nights per Week, Two Hours per Night.
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2. Engine Design and Construction
3. Carburetion and Ignition Timing
4. Engine Troubles and Repairs
5. Ignition 1—Beginning
6. Ignition 2—Advanced
7. Starting and Lighting
8. Service Work 1—Beginning
9. Service Work 2—Advanced
10. Repair Shop Methods
11. Battery Care and Tests
12. Battery Shop Practice
13. Tire Care and Tests
14. Vulcanizing Shop Practice
15. Motorcycle Care and Repairs
16.
17.
18.
19.
20.

Date Enrolled: Oct 4 1921
Nights Preferred: Mon. & Tues.
Card Granted:
Diploma Granted:
Date Discharged:
✓ Tradesman
Beginning Tradesman
Owner Driver
Previous Schooling: 10 years
Ability | Speed | Initiative

Units	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Selected		5	7	3	2		1	4	6									
Assigned		✓	✓		✓		✓	✓										
Completed		✓	✓		✓		✓	✓										
Rating																		
Tuition																		
Shop Fee		PM	PM		PM		PM	PM										

AUTOMOTIVE TRADES SCHOOL
No. 37 11-6 1921
INCIDENTAL FEE RECEIPT
Received of Saul Polinsky $1.00
One and No/100 Dollars Incidental Fee for one Short Unit
Course No. 7
Roy E. Bakell
Instructor.

Receipt Stub No. 37
Date 11-6-21
Amount Collected $ 1.00
Student S. Polinsky
Unit No. 7 Room 18
Instructor R E B

(LEFT) STUDENT'S CLASS CARD; (RIGHT) RECEIPT FOR CLASS FEES.

satisfactorily as far as the students were concerned. The development of instructional equipment will be discussed in another issue, but there is one point where the night students have been a very real help. After the school grew in point of numbers it was necessary to add new equipment and in some cases replace that worn out in handling. The question of asking the board to finance the purchase of this equipment was a serious one, since the process is a never-ending one. After much discussion it was decided to place the problem before the students. Accordingly the matter was explained to them, telling them that if they would each pay a small incidental or laboratory fee for each unit, the equipment could be maintained in good condition. To make the matter a democratic one they were asked to vote—secret ballot—on the proposition. The result was that they were unanimously in favor of it and thus originated the shop fee charge of one dollar for five weeks or one unit of work.

The money thus collected is used as a school fund and is expended, practically as fast as collected, for equipment. In passing it might be mentioned that the purchase of modern used cars—cars three to five years old or wrecks of new cars—is the most satisfactory as well as economical means of supplying equipment. This also furnishes real work for the students, in rebuilding worn units, for instance. There is little value in having a student disassemble and reassemble a generator or starting motor which has never seen service, but to rebuild one from a used car is real trade training.

The Automotives Trades School at present is housed in a building built for school trades work. The lessons learned in the early organization and administration have carried over. The same teachers are at work in both the day school and the night school. This is an item of great importance to a smooth running organization. New problems are arising from time to time but with four years of experience back of the school —experiences which have been recounted more or less faithfully in this article—their solution is far easier and more certain to be correct.

Teacher Training in Service

J. J. Eaton, Yonkers, N. Y.

PROBABLY one of the most difficult duties of a principal of a vocational school is to help the shop teachers to become better qualified to conduct their shopwork. Whereas the principal of a grade school or of a high school may assume control of a class and inspire and instruct a teacher, the vocational school principal is handicapped in applying this principle of direct leadership by the lack of knowledge of each of the respective trades taught in the school.

In well-organized vocational schools a thorough analysis of each trade taught is made by competent people and readjusted on the basis of understanding, or, in some cases, of manipulation. For example, in the pattern making trade where practically the same materials are used in all work, the chief difficulty is one of construction, and the shopwork is graded on operations where the degree of difficulty is gradually increased. In addition, as an integral part of the machine and tool work, is a vast amount of socalled related knowledge. School teachers have divided this latter into several major divisions, calling one science, another drafting, another mathematics, and a fifth trade terms. Possibly equipment and materials have been classed as a sixth division. Of course, all schools teach English, but the English taught is that which ought properly to be taught to pupils of an equal grade of ability in any school. While the content of the courses might easily become a matter of familiarity to the principal of the school it is easy to see that the manipulations and operations are an entirely different matter.

In some other trade like that of plumbing, analysis shows that there are several major divisions based in great part upon materials used. For example, joining two pipes of cast iron together is entirely different from joining two pieces of lead pipe.

Heretofore, shop teachers have been concerned chiefly in teaching the trade terms as they have occurred and without checking in any way to see if they have covered the ground properly and completely, in addition to giving instruction in operations and processes. In planning the courses, they have, to a certain extent, cooperated with the special teachers of the related subjects mentioned, and then have left it to those teachers without giving the matter any further thought. In fact, they have in most cases, limited their teaching and care of the pupils to the bounds of their own shops and have been unable, probably because of the peculiar training incident to their trade experience, to grasp the need of definite work with the pupils and for the school as a whole that has no obvious connection with their shop; that is, their thought is limited chiefly to manual and machine operations. This is not in the nature of a criticism, but a statement of fact as I have observed and only what one might predict as a natural tendency. It is regarding this particular side of their work, which, for the want of a better term, is called a "professional viewpoint," this article is written.

Of course, it is possible to stimulate the shop teachers to undertake extension courses offered by colleges; to subscribe for and read proper magazines and books; to visit other schools; to attend meetings of school organizations; to plan courses of work; to study shop organization and formulate lesson plans; and, through faculty meetings, to help promote harmony and helpfulness. Visits and actual work in factories provide a means for keeping in contact with the trade. But there is a point of view that few shop teachers seem to be able to obtain, that is, a professional attitude toward their work.

While it is still necessary to select a shop teacher primarily upon his trade experience and personality, it will be found that his training in the shop has given him a shop attitude toward all of his activities which it seems almost impossible to eradicate in so far as such attitude conflicts with what is called a professional attitude. For example, how many teachers of shopwork voluntarily remain after school hours to help pupils who are behind with their work? How many feel the pressure of actually bringing a class up to a certain defined standard such as is met by the teacher whose pupils must undertake examinations like those required by the Regents of the state of New York? How many devote their time outside of school hours to "correcting" the work performed by their pupils? How many understand their relationship to the school as a whole and their share in the extra class and shop duties of the school, such as hall duty, checking of irregularities in attendance, care of the school property outside the shop, and the many activities and responsibilities which the professionally trained teachers accept without question?

This is not a criticism of the shop teacher but of his training or the lack of it. It is only natural that if he knows his trade—and he ought not to have been appointed if he does not—he will have this socalled shop attitude toward his work, just as a person who studies a new language after he reaches maturity will still retain traces of his native speech.

What can be done to give the shop teacher this professional attitude? He cannot afford to drop his work and then secure the necessary training. The ordinary methods in vogue do not seem to accomplish the desired results; in fact, most shop teachers seem to feel it to be a personal and not a school matter when the principal undertakes to help them. In many cases their attiude is, "What does he know about my trade"?

Thus, notwithstanding the fact that many shop teachers have faithfully studied what is called the mechanics of teaching and are to be commended for the progress that they are making—probably greater than has been made by the few men who have had the necessary professional training and then afterward have tried to qualify as shop teachers—there ought to be some method devised to educate the former so that they may take their proper places beside the teachers of traditional subjects in other schools.

A solution suggested is to place certain class subjects in the hands of the shop men. This transfer of the teaching of the related work from the academically trained teacher to the shop teacher will, in my mind, have a two-fold desirable result. First, it will be possible to present to the pupils the related knowledge that they need at the time when they need it, and when they feel the need of it. While the pupil may feel that the teacher of drawing, for example, possesses a knowledge of drawing and is helping him to become a better draftsman, he finds it difficult, if not impossible, to link up the drawing with what he is interested in in the shop. There is no direct bond established between the shopwork and the drawing. This is also usually true of the other related subjects.

Certainly the shop teacher, if he was a successful and skilled tradesman, must have acquired a sufficient knowledge of drawing, mathematics, and science to have made him competent to do his work while in the trade and possibly to direct other workmen and to supervise their work. As a rule, like the difficulties they find in developing a course for the school shop, they have never organized their knowledge of the related work.

The second result of transferring the teaching of the related work to the shop teacher ought to develop the idea of professional responsibility. He will more completely realize that his work is not a unit by itself, apart from the rest of the school, which can be bounded by certain established hours, but that he has entered a profession whose limits are bounded only by the needs of the pupil whom he is trying to develop.

A First Turning Lesson in Machine Shop Practice with Correlated Academic Subjects

Herbert D. Harper, Murray Hill Vocational School, New York.

IN the average vocational school, the student is mainly interested in his shop subject. Academic work is looked upon as unnecessary, and endured merely because the school authorities will not grant a diploma without the knowledge of some academic work. Accordingly, academic work is something to put up with, a period for dozing, with the knowledge that it has to be endured for only half a day when he will be released to go to his well liked shop.

The academic departments are to a degree, responsible for this attitude on the part of the student, because in the majority of schools the academic work taught has no bearing on the trade that the student came to learn. Instead of using the interest in the shop subject by relating the academic subjects to it, in many schools the academic teacher has no idea whatever of the students' shopwork. To remedy this fact every teacher should have a copy of the blueprint used in the shop and the academic work correlated with it.

To show how this can be done, I offer this first turning lesson in machine shop practice. The lesson is based on the assumption that the student has a week of 40 periods of 45 minutes each, divided somewhat as follows:

Shop	20 periods
English	5 periods
Drafting	4 periods
Mathematics	3 periods
Physical Training	3 periods
History	2 periods
Science	2 periods
Assembly	1 period

As the academic department corresponds to the engineering department of a factory, the shop project should originate there. This lesson, therefore, starts with the drafting room, the student being informed that the center punch will be his first turning lesson in the shop.

Drafting Room Lesson.

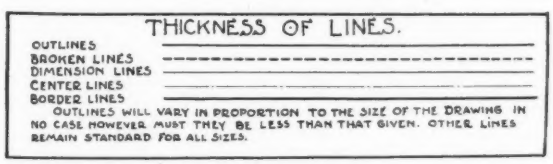
The instructor should have a model and state the purpose of the lesson, i. e., "To draw a center punch."

(1) How to tack the paper to board.

(2) How to draw border lines and the outline of title space.

Show use of tee square and triangle.

A chart like the following is useful:


THICKNESS OF LINES.
OUTLINES
BROKEN LINES
DIMENSION LINES
CENTER LINES
BORDER LINES
OUTLINES WILL VARY IN PROPORTION TO THE SIZE OF THE DRAWING IN NO CASE HOWEVER MUST THEY BE LESS THAN THAT GIVEN. OTHER LINES REMAIN STANDARD FOR ALL SIZES.

REDUCED FACSIMILE OF CHART SHOWING LINES USED IN DRAWING.

(3) Third angle projection: Show that three views will give all necessary information; the need of a standard method of representing an object. The amount of detail shown should be sufficient to convey a definite knowledge of what is required to the shop. More than this is unnecessary.

(4) Draw the center lines for the piece of stock. Show use of compasses and construct end view.

(5) Draw the body of the piece of stock. Explain distance between views.

(6) Draw the outline for second operation; explain knurling.

(7) Draw third operation. Explain taper.

(8) Draw fourth operation. Explain use of broken lines.

(9) Make freehand sketch.

(10) Dimension: Dimensions are most important. They must be those which will be used in the shop. Unnecessary dimensions must be omitted. In no case must it be left to the machinist to add dimensions to obtain a necessary measurement. Shortest dimensions must be nearest the outline. No dimensions must be placed within spaces less than 3/8 inch wide. A dash must in all cases be placed between the foot and inch figures, thus: 2'—6" instead of 2' 6". Express all dimensions under two feet in inches. Minimum size for dimension figures is to be, for whole numbers 1/8 inch high for fractions 5/64 inch.

(11) Title space. The printing of the title space may be left until the student has had instruction in printing. As good printing is the result of practice, the student is liable to become discouraged if kept on a sheet until his printing is satisfactory. Ten-minute practice every day is recommended.

English Lesson.

Spelling.

(1)	machine	(6)	lathe
(2)	taper	(7)	knurling
(3)	chamfer	(8)	center-punch
(4)	tool-post	(9)	chuck
(5)	dimension	(10)	spindle

Sentence Structure.

Use the above words in sentences of not less than six words.

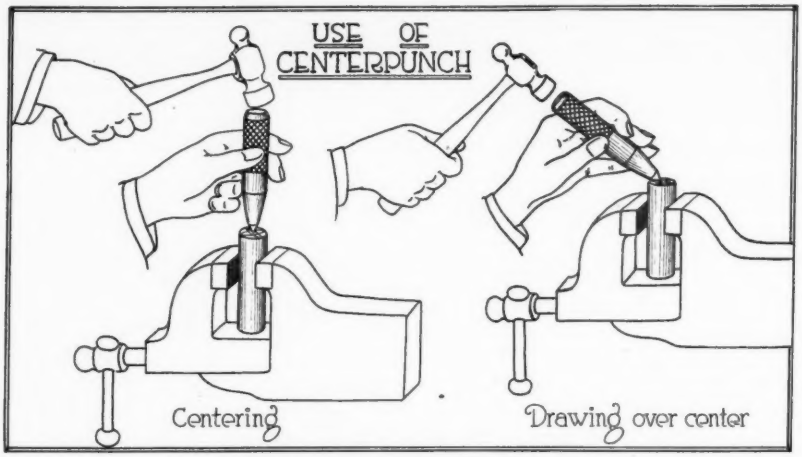
(The words should be given a day before recitation, so that the meaning of the words may be looked up in the dictionary.)

Composition.

Not less than 100 words.

(a) Why I desire to become a machinist.

(b) How I made a center punch.



TYPICAL USES OF THE CENTER PUNCH.

Business.

Write a letter ordering enough steel to make 100 center punches.

(Explain that steel is bought by the pound and the price fluctuates with the market. The weight of one center punch was found in mathematics class.)

Mathematics Lesson.

(1) Add the three dimensions in operation No. 2.

(2) Find the difference between the diameter of the piece of stock and the finished center punch.

(3) Add the three dimensions in operation No. 3.

(4) In example 3, which dimension is the largest and how much larger?

(5) Find the length of six pieces of stock.

(6) How many pieces of stock can be cut from a bar 6′ — 6″ long?

(7) In example 6, what size piece is left over?

(8) Find the total length of the finished center punch.

(9) Find the circumference of the piece of stock of the finished center punch.

(10) If round stock $\frac{3}{8}$ inch in diameter weighs 0.378 lb. per lineal foot, find the weight of 25 pieces of stock.

(11) The 3° taper is what part of a circle?

(12) Find the area of the piece of stock.

Science Lesson.

Composition of center punch—

Drill rod—steel, i. e., a metal.

Metals.

Iron—copper—lead, etc. Differences between metals.

Why iron is used instead of copper.

Iron put on market in three ways: (a) cast iron, (b) wrought iron, (c) steel.

Various kinds of iron: Bar, angle, flat, rod, sheet, hoop, band, plate, galvanized, etc.

Wrought iron: Composition and difference.

Various kinds of steel: Bessemer, cast, manganese, nickel, etc.

Various uses of steel: Structural, machine, etc.

Composition of steel for various purposes, showing carbon content.

Construction of center punch.

Explain: Shape and use. (See chart.)

Show how the point follows the principle of the wedge.

Show how the hammer follows the principle of the lever.

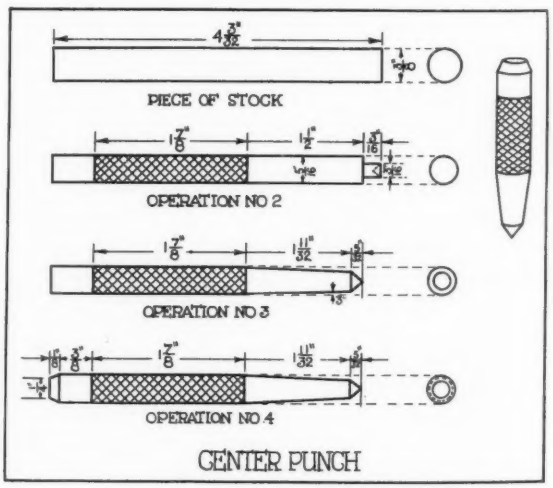
History Lesson.

The steel scale used in the machine shop to measure the center punch is part of the measuring system, which is the backbone of the modern interchangeable system of production. In order that a 2 inch measurement in New York will correspond to a 2 inch measurement in San Francisco, they would have to be made from the same standard of length. A great amount of labor and research have been used to establish such a standard.

The "British Imperial Yard" is the standard unit of length of English speaking peoples. This yard was adopted by Act of Parliament in 1824. The metallic representation of this unit was destroyed by fire in 1834 and then a more accurate standard was made and a number of duplicates given to other countries. This "yard stick" was made legal in England in 1855 and the duplicate given to the United States in 1856.

This duplicate is made of a composition called "Bailey's metal," the bar being 1 inch square and 38 inches long. Lines 36 inches apart are marked upon gold studs sunk to its neutral axis to provide against flexure. The British yard was established as standard when in a room whose temperature was 62 F., as changes in temperature affect metals.

Although the duplicate for the United States was made with the greatest precision, it was found to be



DETAILS OF CENTER PUNCH.

0.000088 inch short at 62 F. To overcome this defect the temperature of the room where it is kept was raised to 62.25 F.

Manufacturers of measuring instruments use duplicates of this authorized standard, and the scales used in the machine shop have been checked to one of these duplicates.

Machine Shop Lesson.

The instructor should give a fifteen-minute shop talk, giving the following information:

(1) Material of which center punch is made, i. e., drill rod.

(2) Names of parts of lathe student will use.

(3) The speed of the lathe: in this case is third speed. The power feed on lathe is to be disconnected, the student moving the carriage by hand.

Operation Chart.

Place universal 3 jaw chuck on lathe.

Insert piece of stock and face both ends, using a side facing tool.

Using the same tool, turn end to 3/16" dia. 3/16" long.

Center piece of stock, using combination center drill No. 00 held in tail stock chuck.

Using tail stock center to support the work, turn to 5/16" diameter. Use diamond point tool, properly ground.

(The work should project 3¾" from chuck.)

Knurl the distance given in operation No. 2, using knurling tool.

Set compound rest to 3° and turn taper. Use diamond point tool.

Withdraw tail stock center and face off the center hole in stock. Use side facing tool. Set compound rest to 59° and turn point. Use diamond point tool. Reverse piece in chuck, place piece of paper on knurled part to avoid injury. Turn end to 5/16" diameter and chamfer end. (The hardening should be taught at a later lesson.)

The Manufacture of Platinum Jewelry

W. Calver Moore, Philadelphia.

BOTH art and mechanical skill of high degree, as well as many specially designed machines, are involved in the manufacture of platinum jewelry. During recent years, this branch of the jewelry manufacturing business has become an important factor because of the steadily increasing popularity of hand engraved platinum wedding rings, platinum and diamond brooches, bar pins, lavallieres and other pieces, and, as a result, employs a large total of capital and labor.

There is an ever increasing demand for men capable of doing this grade of jewelry work, originating new designs, or improving the methods of manufacture, or cutting down the cost.

Platinum, when alloyed with iridium, which is another metal of the platinum group, is peculiarly suitable for use in the jeweler's art, owing to its wear resisting quality which insures the permanency of settings for precious gems, its great ductility, its immunity to tarnishing, and the neutral gray color because of which it sets off the brilliancy of diamonds and makes them appear larger than settings made of any other metal.

Its popularity, however, is comparatively recent. Within the memory of the present generation it was used almost wholly for chemical and electrical purposes and sold for as little as five dollars per ounce. The increased demand for jewelry purposes, together with the small world supply, has forced it up to five or six times the price of gold, or from eighty dollars per ounce upward, according to percentage of alloy.

Pure platinum would not be suitable for jewelry working, so it is alloyed with five or ten per cent of iridium to obtain the required degree of hardness. The percentage of iridium, in fact, may be as high as fifteen and twenty for some of the fine and delicate work requiring strength, such as the thin, lacy parts of bar pins, brooches and so forth, where the diamonds "look like dew drops caught in a fairy gossamer" as one writer has expressed it.

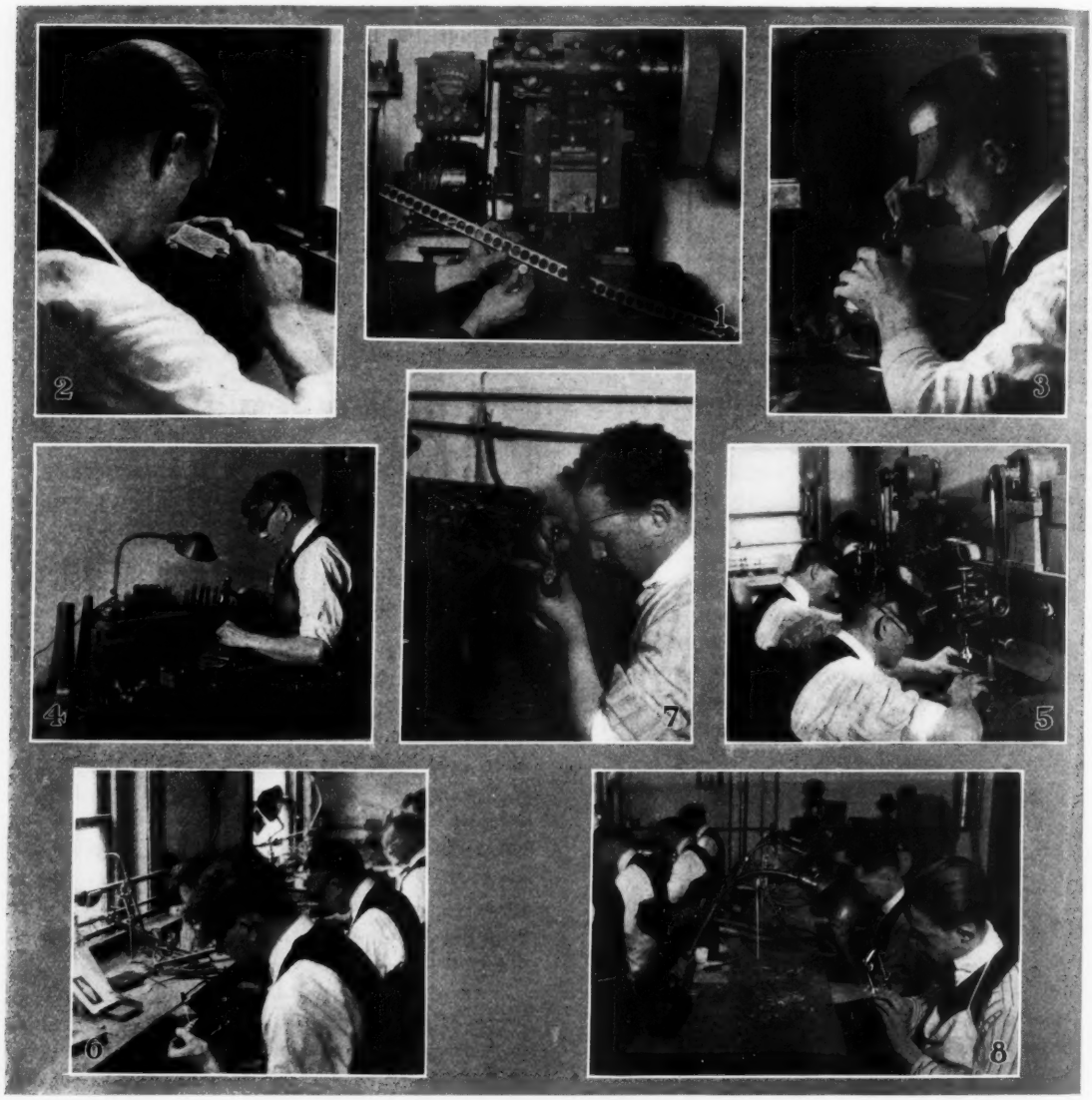
There are more than a million and two hundred thousand marriages in the United States annually, and the wedding rings that are so important on these occasions have felt the influence of changing styles. The plain gold band that once stood as the accepted mark of the married woman is going out of popularity. If gold be used at all, the ring must be engraved with orange blossoms, lillies of the valley, or other appropriate design, but, the really popular ring is the hand engraved platinum ring and enormous numbers of them are being sold. Many are set with three or more small diamonds.

In order not to be stamped "old fashioned" many brides of yesteryear are also having an engraved platinum overlay put on the plain gold ring, and this is one of the interesting uses for platinum that is consuming it in large quantities.

It is our purpose here to deal with a few of the principal processes in the manufacture of platinum wedding rings of the better grade, the overlay of the old ring, the die stamped engagement ring, and the brooch or bar pin set with diamonds, the last being, perhaps, a special order.

Alloying is practically the same in all cases, except for the different proportions of iridium already mentioned. The metals are very carefully weighed out in the exact quantities for the job in hand and are then melted together in a crucible.

The ingots which result after the alloyed metals are cast in a mould, are rolled out into strips under heavy pressure. Taking first the wedding ring job, these strips are fed through a power punch press which dies out round, flat pieces, or discs, which are next fed into another punching press that punches out the centers. This produces rough ring blanks that have flat decoration by sharp steel gravers. Up to this point the work has been done by machines, but the work of the hand engraver calls for a high degree of skill. Polishing and buffing to remove all roughness, and the stamping of the trademark inside the ring, bring it up to the inspector, from whose hands it goes into stock and is ready for the jeweler.



DETAILS OF PLATINUM JEWELRY MANUFACTURE.

1. Blanking out the gold disks on power punch press. Next operation consists of punching hole in center, making a flat blank, which is struck in a forming die, bringing out the general shape of the wedding ring. 2. Engraver transferring design for brooch to a sheet of platinum. It is then turned over to the jeweler who pierces, daps up, solders and finishes it ready for the setter who sets the diamonds. 3. Engraving finished wedding ring. 4. The jeweler dapping up, or modeling, the dome shape of a brooch. 5. Drilling holes with a foot power drill to permit the design to be sawed out. 6. Sawing out the filigree work. 7. The diamond setter at work. 8. Apprentices sawing out design in the halves of die struck rings.

sides and sharp edges, like ordinary metal washers. In order to give the rings the proper cross sectional roundness, they are next struck in a forming die, which gives the flat washer-like blank very much the same shape as the common gold wedding ring. Each ring is now slipped onto a tapered mandrel and the outer surface finished by turning on a specially built lathe. After this the rings go to the hand carver, who applies the

The platinum wedding rings that are set with stones go through essentially the same processes as are described further on for brooches, holes being drilled at several points in the circumference to allow for the formation of bezels, as the metal parts actually clamping a stone are called.

A similar process of stamping out produces the blank that is used for an overlay on an old-fashioned

gold wedding ring, and the new ornamentation is applied without disturbing the engraved inscription on the inside of the old ring that may be so tenderly regarded by its owner.

Some of the old rings are so wide or so thick that they must be turned down with a lathe before the platinum overlay can be applied, but, once having the old ring reduced to the proper size, the outside ring of platinum is forced onto it, the edges welded and polished until there is a perfect union of the two, the hand carving is applied as described in the case of the solid platinum ring, and when the owner gets her ring back from the shop of the platinum smith, by way of the family jeweler, it is to all intents and purposes an up-to-the-minute carved platinum wedding ring, with nothing to give away the date inscribed on the inside of the original gold band.

BROOCH IN PLATINUM.

A great deal of the work of the manufacturing platinum smith comes to him from the retail jeweler in the form of remounting orders. One or more pieces of gold jewelry set with diamonds will be sent in with orders for a new design. Perhaps the diamonds are to be set into a platinum brooch, and the old gold allowed for toward the cost of the job.

The designer in the platinum shop receives the stones that are removed from the old settings with instructions to make up a special design showing how they can be utilized to the best advantage. Some additional small diamonds may be added to contribute brilliancy to the finished piece. These designs for the customer's approval are made by painting with Chinese White on pieces of transparent celluloid. The size and design of the finished piece is shown with all its tiny details and the size and location of each gem that is to be included. Making these designs for platinum jewelry is an art in itself and much skill is shown in the finer specimens. There is also a process of modeling

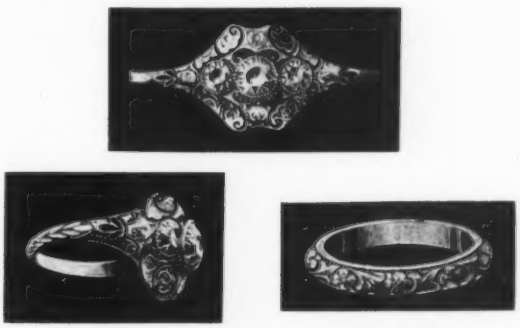
BAR PIN IN PLATINUM.

the suggested piece from a composition of rubber, which results in a still closer approach to the finished article. The design painted on celluloid is the one most commonly used.

After the design has been approved, it is turned over to the engraver who transfers it to a small sheet of platinum. Then it goes to one of the jewelers in the platinum shop, who daps it up into the swell front shape that is called for by most brooch designs, pierces it, solders and finishes it, ready for the setter who sets the diamonds. The dapping up, or modeling, of the dome shape that has been referred to must be done very carefully to insure grace and elegance in the finished brooch.

The filigree work in the brooch is made by first drilling many small holes by means of a foot power drill. These must be spotted in many places throughout the design, as it is necessary to insert a saw blade that is not much larger than a horse hair to saw out the filigree. While the workman is doing this drilling and sawing out he has a wax box on the bench before him that contains all the diamonds that are to be used, arranged according to the approved design. A place in the piece of platinum must be made for each diamond or other gem. It is necessary to consider its size, thickness and shape, for all diamonds are not round, and other gems are cut in a variety of shapes.

The setter is the next man to handle the job. He puts on the fine bead work and does the milgraining. His work is very tedious and important in the final result, as he must handle and set the tiny diamonds, called melee, which are used to pave the finer pieces of jewelry.



ENGAGEMENT RINGS AND WEDDING RING IN PLATINUM.

Next the polisher with his myriad shapes of brushes, laps, and felt wheels, his tripoli, rouge and ruby powder applies the luster that the finished piece requires to please the eye.

The fine grades of platinum rings are made by the same painstaking processes described here in the case of the brooch, and many special orders call for the remodeling of rings, perhaps with the addition of several small stones set into the shanks. The finest engagement rings of today are in this class and instead of having the single stone in a clawlike setting, such as used to be the popular thing, will have small ones surrounding it, or set at points in the side or shank of the ring. In many cases pieces of sapphire or other gems of suitable color are set in to form possibly a ribbon effect in the ornamentation.

Some economies are effected in the manufacture of platinum rings for stock by stamping out the two sides separately. Much care is exercised in deciding on a design for this class of work, because its artistic quality, salability, and suitableness for making by a die must all be considered, and the steel dies required for this class of work are very expensive to make.

However, once the design has been approved by the manufacturer and the dies made, the sides, or halves, are struck under a hydraulic press, capable of exerting a pressure of one hundred and eighty tons by the pumping of a hand lever. The blanks are placed between the two halves of the die and the design is transferred to the metal in this manner instead of being done by hand as in the case of the special order brooch. The forming and piercing of the metal is also done in the same operation, thus saving the dapping up by hand and the hand drilling, so that apprentices can easily saw out the design. All that remains after this has been done is to assemble the two parts of the ring, polish and finish it and it is ready for stock.

The methods briefly described herein are in force in the Philadelphia plant of Byard F. Brogan, one of the largest and most modernly equipped establishments in the country, engaged in this class of work. This concern does not retail its product, but supplies the trade and makes up special orders for retail jewelers in all parts of the United States. Similar plants are also situated in Chicago, New York and several other large cities, and, all together, represent a considerable industry, which is supported by an entirely different demand than that to which the jewelry factories of Providence and Attleboro cater. In the last named centers are the principal factories engaged in producing 10-karat to 14-karat solid gold jewelry and the various grades of gold plated and sterling silver novelties. New England is also the center of the silverware manufacturing industry and is famous for its large watch factories. It is necessary to explain this general distribution of the jewelry and kindred factories in order to make clear the fact that a special industry of no inconsiderable size has grown up in connection with the manufacture of the special grades of platinum jewelry described. Newark is also a leading center for the manufacture of the finest grades of platinum, gold and gem-set jewelry, perhaps owing to its proximity to New York, which is the diamond center of this country, but even Newark owes much of its volume of business to the vogue for platinum jewelry.

From all indications it would appear that platinum has come to stay and that the eventual market for jewelry made of it has hardly been scratched.

A word about the metal, itself. The first reference in European history was in a book written about the year 1600 which speaks of an infusible metal discovered in the mines of Mexico and Darien (Panama). It was discovered also in the mines of Choco, Peru, in 1741, and again in 1819 in washings from gold mines in the Ural mountains which constitute the boundary between Russia and Siberia. In 1822 some very rich deposits were located, and since then Russia has been the source of the bulk of the world's supply. Columbia, South America, is the next largest producer, although traces have been found in California, Oregon, Canada, Alaska, Mexico, Brazil, and some other countries.

Pure platinum has a specific gravity of 21.4, which is only one point less than osmium, the heaviest metal known. It is twice as heavy as lead. Platinum melts at 3,227 degrees Fahrenheit, while gold will melt at 1,863 degrees. The melting of platinum is effected by means of the oxy-hydrogen flame, discovered in 1810 by Dr. Robert Hare, of Philadelphia, who also invented the blowpipe used by the jewelry craftsman.

Weaving a Boudoir Lamp and Shade With Paper Rope

Jane Littell, New York City.

DO you ask, what is paper rope? It is a rope made of twisted paper, and can be bought in hanks. Paper rope is made in three sizes—1/16 inch, ⅛ inch and ¼ inch. Baskets, lamps, trays and even chairs and tables are woven of it. In fact, paper rope is becoming a rival of reed, wicker, and raffia. There are several reasons for this, for paper rope is pliable and easy to work with, and yet it is strong and has superb wearing qualities. The finished work is given a coat of shellac, or is stained and varnished, to preserve its beauty during hard use.

The boudoir lamp in the photograph embraces all the steps in rope weaving, and after these are mastered, any article can be made by using the same methods of work.

The completed lamp measures twenty inches high, and the materials cost about five dollars. The materials required are fourteen wires 1/16 inch in diameter and eighteen inches long for the base—dealers usually refer to this wire as No. 78; forty-one wires ⅛ inch in diameter and nine inches long—called No. 7 wire—for the shade; seven hanks of ⅛ inch rope, one fold of crepe paper to match the rope used, for winding the wires; a tube of glue and a tube of paste; one spool of covered wire such as is used in making flowers; one electric table standard ten inches high, one wire shade frame ten inches across the bottom and six and a half inches high, and one pair of wire cutters.

Preparing the Wires.

This work should be done on a table. If the fourteen wires for the base are not cut to the desired length

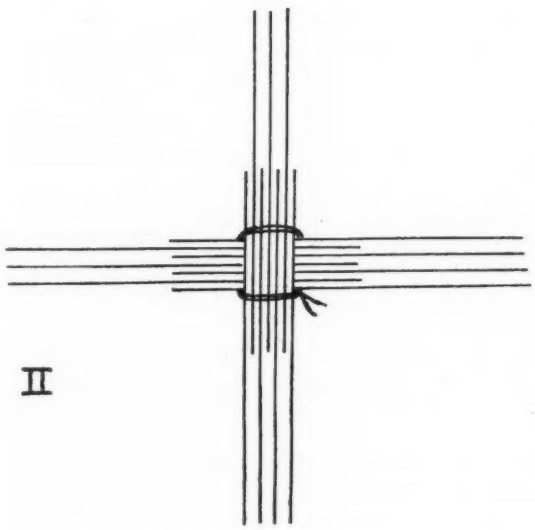
WOVEN PRODUCTS MADE OF PAPER. THE LAMP IS DESCRIBED IN THIS ARTICLE.

when purchased, use the wire cutter to snip the wire into eighteen inch lengths. Then wrap each wire with a strip of the crepe paper three-fourths of an inch wide. To cut this strip, push the paper out from under the covering of the packet, measure off three-fourths of an inch, and using the edge of the cover as a guide, cut through the entire thickness of the fold with sharp shears. This saves time in preparing the strips and insures their being the same width. Dip the end of one wire in the paste, and fold one end of the strip of paper over the end of the wire. Then, turning the top edge of the strip in, twirl the wire between the thumb and fingers of the right hand, at the same time stretching the strip of paper with the left hand, and slanting it downward toward the other end of the wire. At the end of the wire, when it has been entirely covered, cut off the paper and paste into place.

Getting the Wires Ready for Weaving.

The base of the lamp needs more wires to weave over than does the upright part. In order to arrange for this, the wires are overlapped as shown in Figure I. Take seven of the wires and place them as shown, so that the distance from the end of a long wire on one end to the end of a long wire on the other end is twenty-six inches. The short end of each wire overlaps the next one ten inches. Arrange the remaining seven wires the same way, and lay one group across the other, crossing them in the center. Fasten the two groups together with spool wire, as shown in Figure II. To do this, place the spool wire under the group to the right, over the top group, under the left group, and over the group nearest you, and so on around twice. Then twist the spool wire ends tightly together and cut off. This wire is later cut out of the lamp base. Keep all wires flat on the table while fastening them together.

I



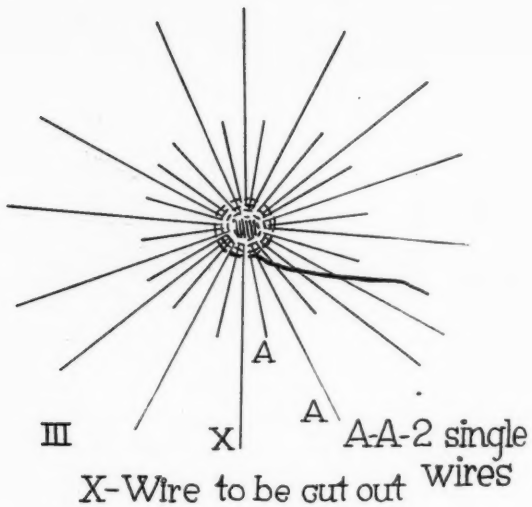
II

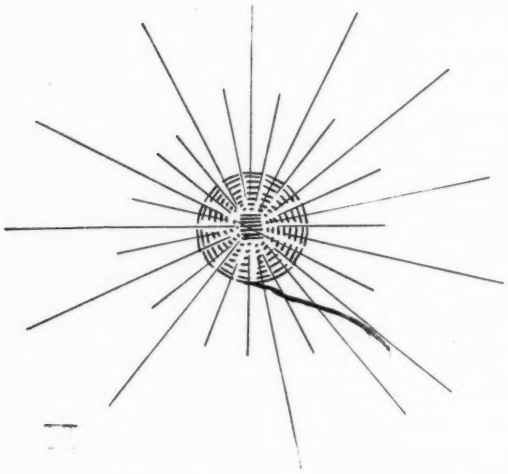
Separate the wires into groups of two each, the groups consisting of a long wire and a short one. Separate one group into single wires, to make the odd number necessary in all weaving, and begin weaving by placing the end of the rope between these two single wires. Weave seven rows over two wires and under two, treating the two single wires as if each were a group of two. Figures III and IV will show how the center should look.

After seven rows have been woven, cut out one long wire from one of the groups, and separate the rest into single wires. This is necessary in order to have an odd number of single wires on which to complete the weaving.

Continue weaving over one wire and under one until the base is the same size as that of the lamp standard. With the wire cutter, remove the spool wire that was used to fasten the wires together in the beginning. Place the lamp fixture in the woven base, and bend up the wires, shaping them around the base (Figure V). Continue weaving, drawing the rope tight enough to hold the wires against the lamp base. When the weaving has reached within a half-inch of the upright, cut off all the short wires, leaving an uneven number of long wires standing.

Insert one more rope, and weave with the doubled strand to within an inch of the top of the standard, over one wire and under one. One inch from the top of the standard, cut off one of the ropes, put some glue





on the end and tuck it under the weaving. Continue the plain weaving with the single strand of rope to the top, and finish the four strand edge as follows:

The Four Strand Edge.

Measure the rope strand around the top of the lamp base twice, allow three inches more to facilitate the handling of the rope, and cut off. Measure and cut off

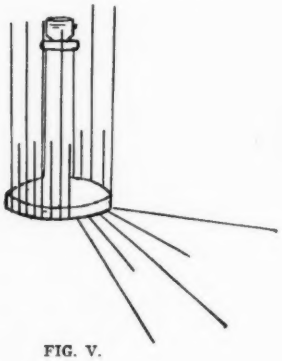


FIG. V.

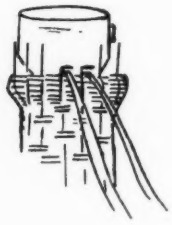


FIG. VI.

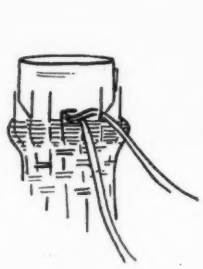


FIG. VII

FIG. VIII

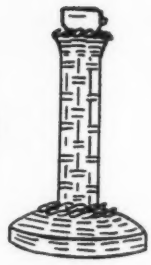


FIG. IX

three more strands of the same length. Glue one of them into the space with the rope weaver already in use, and two more in the next space to the right, making four weavers in all. See Figure VI.

Clip the wire at the left of the rear weavers, leaving about half an inch standing above the weaving line. Bend this wire over the rear weavers tight and flat in the direction of the weaving, as shown in Figure VI. Clip the next wire the same length and bend down over the two forward weavers as shown in Figure VI.

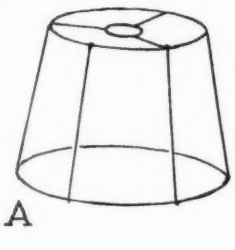
Pass the two rear weavers over the second bent wire, covering it completely, and then pass them back of the next standing wire as shown in Figure VII. Clip this wire, bend it over the two weavers ahead of it, and continue around to the end, clipping and bending and covering one wire at a time. All bent wires will then be covered with the rope except the last one and the one which was first cut and bent. Now lift up the first wire which was cut, pass the weavers over the last bent wire and behind this lifted one, and rebend. Cut off these weavers close, wet the ends with glue and tuck them down in the weaving. See Figure VIII.

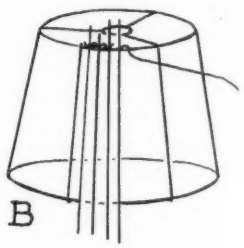
Cover the rebent wire with the two weavers that are left. Then cut them off and glue neatly to the inside edge, concealing the ends in the weaving. Figure IX shows the completed lamp base.

The top and bottom of the shade are also finished with this four strand edge.

Making the Shade.

Wind the wires of the shade frame (Figure A) with a strip of the crepe paper three-fourths of an inch wide. Also cover the 41 wires. Use a strip of crepe paper one-fourth of an inch wide to wind about two yards of the spool wire. This is to be used in fastening

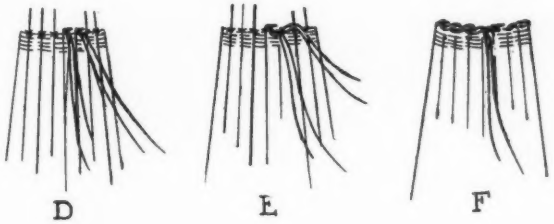




the wires firmly at the top of the frame, as shown in Figure B. There are six sections in the wire frame. In five of these fasten seven wires each, and in the last

section put six wires. Hold the wires to the top of the frame by binding them to the frame with two twists of the covered wire, so that the binding wire forms an X, as shown at the top of Figure C. It is not necessary to fasten the wires to the bottom of the frame, for the weaving will hold them in place.

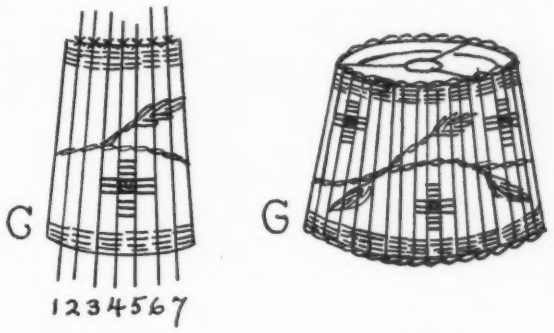
Begin at the top of the shade, between any two wires, and weave six rows plain, over one wire and under one. Cut off the rope, and glue it neatly into place, tucking the end under the last row of weaving. Weave a band of eight rows around the bottom of the shade. Finish the top and the bottom of the shade with the four strand edge.



Weave a flower in each section of the shade. Place some near the top and others toward the lower band of weaving. Weave back and forth three times over two wires to form each petal. Glue a small piece of rope into a flat circle to represent the center of the flower, and glue it into place on the wires of the shade. There are no special directions for the leaves. Weave back and forth on three or four wires to form the shape of the leaf.

For the vine or stem, use the pairing weave. To make the pairing weave, fasten a strand of rope to two consecutive wires, with a twist of the stem wire which has been covered with crepe paper. Take the weavers, or ropes, one at a time, beginning with the one at the left, and weave over one wire and under one, so that the weaving is the same on both sides.

The flowers and leaves may be made in colors contrasting with the rest of the lamp, or they may be made in the same color, with bright colored centers to the flowers.



White shellac protects the completed lamp from dust, and makes it a thing of beauty.

After the shellac is thoroughly dry, line the shade with two thicknesses of georgette or chiffon. This lining can be pasted into place, or sewn. Do not use glue, for glue is continually affected by the heat from the lamps.

Rope for weaving is made in white, gray, red, black and two shades each of green, blue, amber and brown, and crepe paper exactly matching the colors can be purchased for covering the wires. Each color suggests a different article for nimble fingers to make.

The lamp in the photograph was made of white rope, with the flowers and leaves in light amber and green. The shellac gives an old ivory finish to the white rope.

Book Rack Ends

Charles H. Richert and Otis Philbrick, Cambridge, Mass.

MOST people own books of some sort and like to have a convenient way of keeping some of them in sight. This common need has developed a useful and decorative object in the shape of the book rack. These are made in a variety of forms and of a variety of materials, most often either wood or metal. If of wood the decoration is applied by carving or painting—if of metal the design is etched with acid or modeled in clay first and cast in bronze or brass. The latter are a more elaborate form and call for considerable skill and experience in modeling and casting and will not be considered here. Perhaps the most satisfactory material is wood.

A wooden book rack end may be constructed in one of three forms. The simplest form is a block of wood heavy enough in itself to withstand the weight of the books and to keep the books upright. This form is known as a *book rack*, and although simple in form, considerable taste and refinement may be exercised in decorating it. If a thin, tapering piece of wood is fastened to the bottom so as to extend under the two or three end books it will form a much more stable support.

In this case the end piece which in the book rack has to be heavy and solid can be lightened. Sometimes a thin piece of brass or copper may be used instead of wood. This forms the second style of book rack end.

In the third style the two book rack ends are connected in a manner by a shelf upon which the books stand. These ends may be hinged to the bottom board so as to fold flat to allow convenience in packing, or the connecting board may be a sliding arrangement which

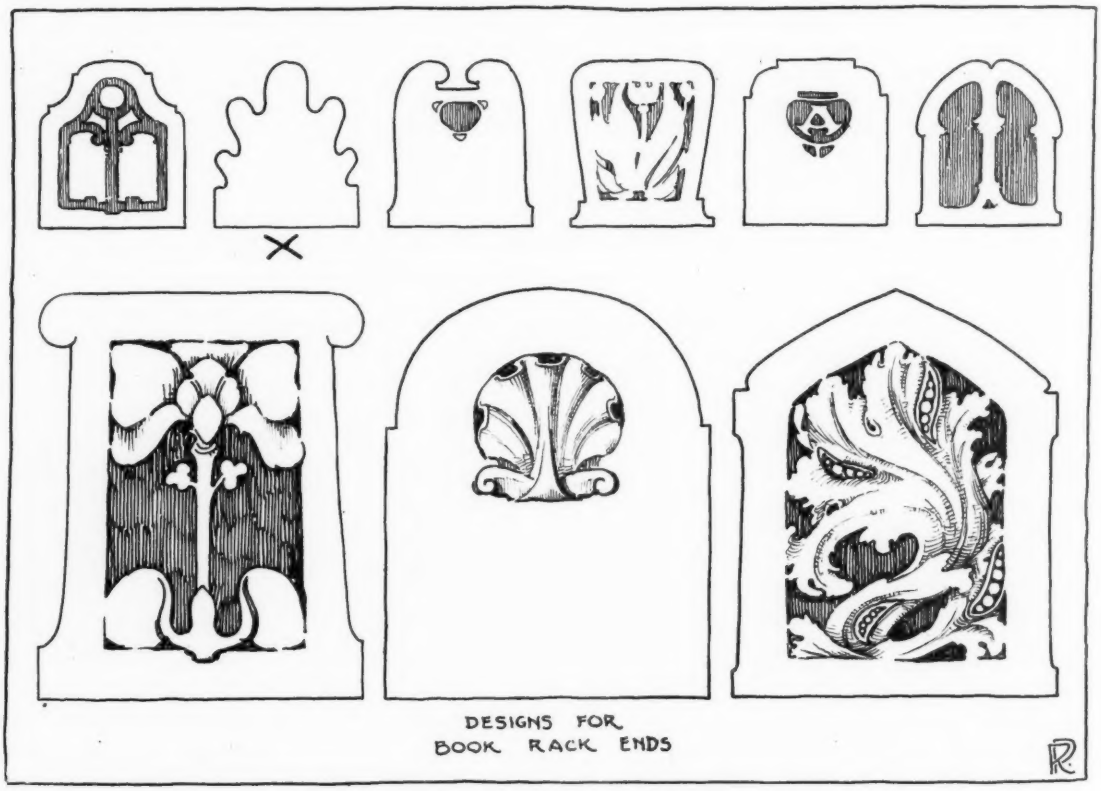
adapts itself to fit the number of books which it contains.

No matter what the style or shape of the book rack ends, the problem of decorating them remains practically the same; that is to say, the problem is that of making a flat surface more interesting and refined, without interfering with the usefulness of the object of which that surface forms a part.

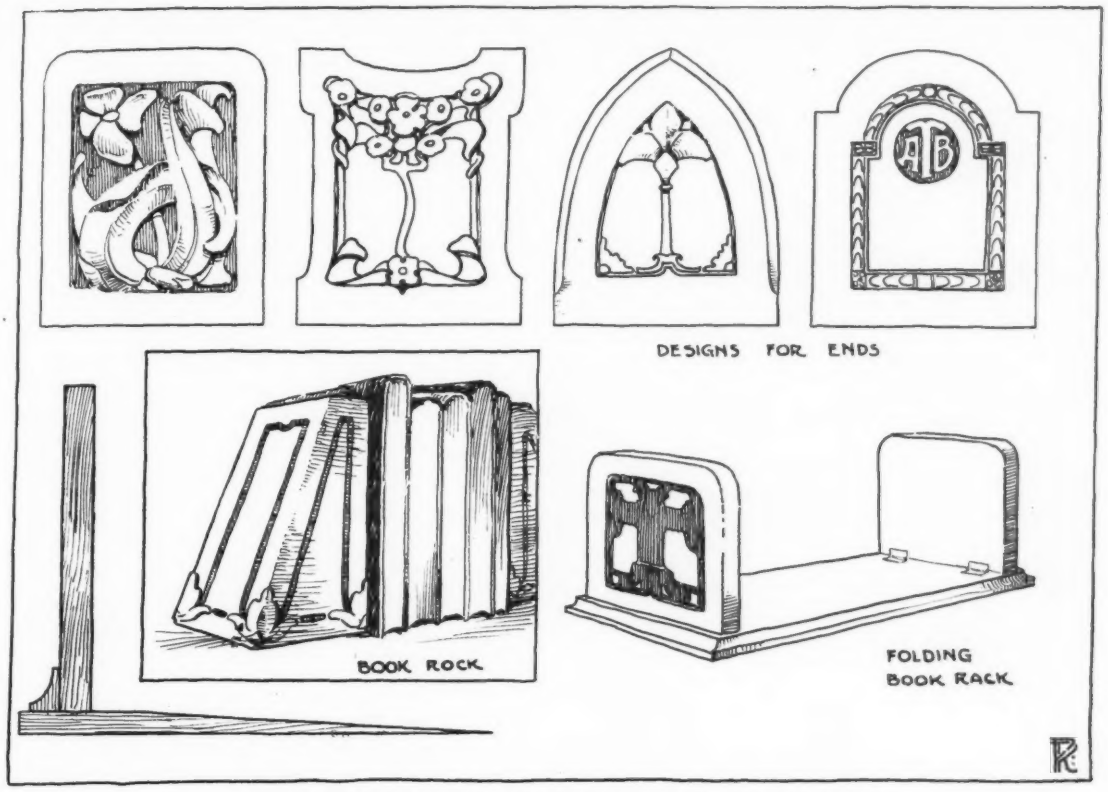
The space to be decorated is the outward surface of the upright piece of wood. Before considering the design to be applied to the surface it is necessary to consider the outer edge of the surface itself. The drawings show a variety of these shapes. Avoid elaborate and intricate cutting on the edges of the block similar to the one marked with a cross.

This shows poor taste and would show it even more when actually worked out in wood just as the good ones in the same row would be even more pleasing when made in wood. Notice that the really good shapes do not lead you very far astray from the original rectangle. In almost every case it is well to leave a substantial margin as a frame or quiet breathing space around the design which it encloses.

When considering the design, bear in mind whether it is to be carved into the wood or painted onto it. In either case it is well to avoid any too literal representation of naturalistic subjects. A finished design should appear to have been influenced by some one's intellect. The word design implies a purpose—implies a controlling interest behind it and a good designer will have absolute control over his material, over the space and over the shapes being fitted into that space, and the lines and forms will radiate, curve, straighten, fatten, reduce, or twist at his commands, and if necessary, at times utterly regardless of how they may be



SUGGESTIONS FOR CARVED BOOK RACK ENDS.



SUGGESTIONS FOR DESIGNS AND CONSTRUCTION OF BOOK RACK ENDS.

found in nature. To have a clear conception of the purpose of the object being decorated, to realize the limitations and possibilities of the materials used, to adapt and utilize the forms and colors of nature and to make them conform freely to his bidding into pleasing and refined surfaces—this is the creed of the designer and, like all good creeds, holds good for all purposes whether jewelry or stained glass, wall paper, or as in this case, book rack ends.

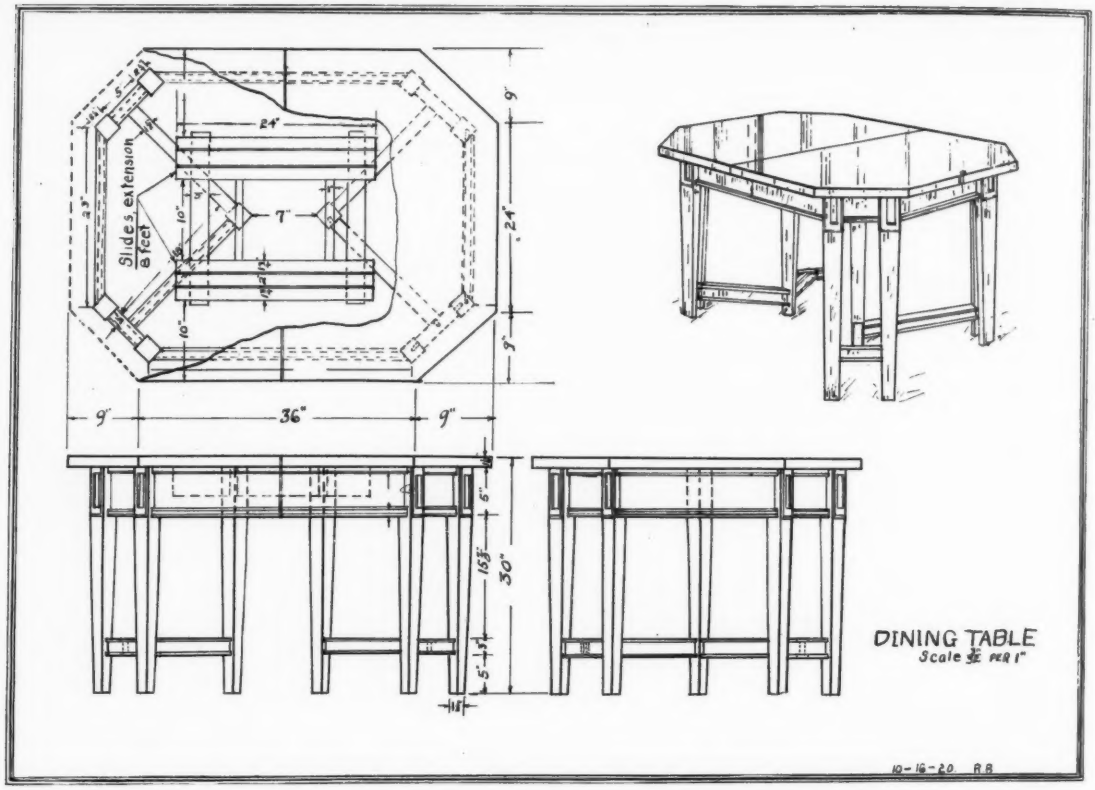
If the design is to be carved it may be approached from either of two directions: the background may be slightly sunken, leaving the design raised, or the design may be carved in a more elaborate manner, showing the twistings and turnings of the leaf forms. The latter method calls for more experience in carving but the possibilities of the simpler style are great.

An effective book rack end may be made with nothing more elaborate than a well designed initial or monogram in a circle or other simple geometric form. Place the design slightly above the center and keep the letter broad and husky rather than thin and stringy.

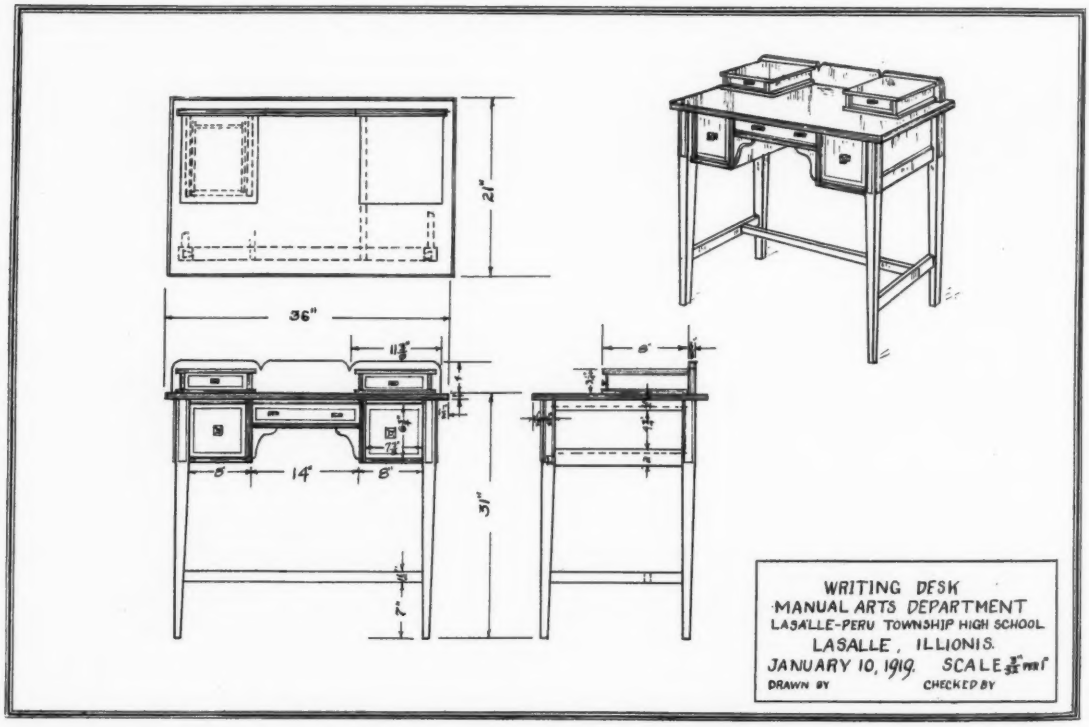
If floral forms are used reduce the shapes to their lowest terms. It is tempting when designing with a pencil to draw intricate shapes which do not lend themselves to wood carving.

A painted design may be worked out in a somewhat more elaborate manner but it is well to limit oneself to flat simple colors and shapes, avoiding the temptation to make a picture out of the book rack end. Two nicely shaped leaves and a dignified blossom; a bunch of grapes with a leaf or two cutting into it so as to form a circular spot or unit; a Viking ship silhouetted in gold against a blue green sea; any of these motives or any one of countless others, if kept quiet and orderly, would enrich the book-rack end and give a pleasing hint of the fruitfulness of, or the adventure to be found within the books which it so efficiently holds.

It is not the purpose of this article or any articles by the present writers to present any one design for any one object and follow it through step by step for some one to make. That might result in a great many objects springing into existence, all exactly alike and all made by persons who simply did the manual labor and had no share in the designing. If the design were sufficiently artistic not a little good would, of course, result from this, but there is a higher purpose which has a more lasting and stimulating result, and a more refining influence on the world as a whole, and that is the purpose of inducing people to be interested in working out the objects which they themselves have designed, or have had a share in designing, so that they themselves will in time be enabled to choose the good from the bad, or, what is much more difficult, to choose the good from the very abundant mediocre.



DETAILS OF A DINING TABLE. SEE PHOTOGRAPH ON NEXT PAGE.



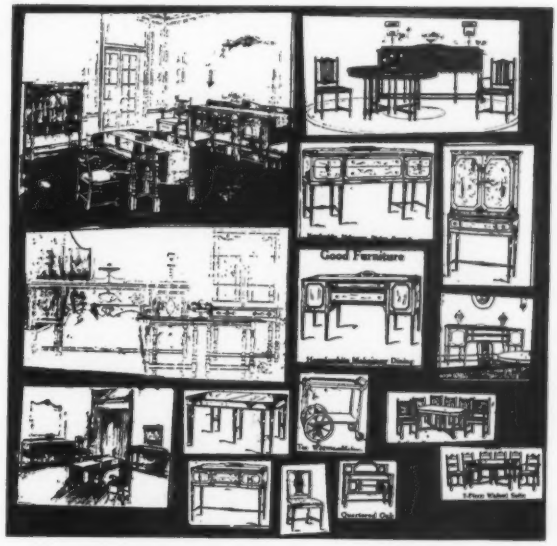
DETAILS OF A WRITING DESK. SEE PHOTOGRAPH NEXT PAGE.

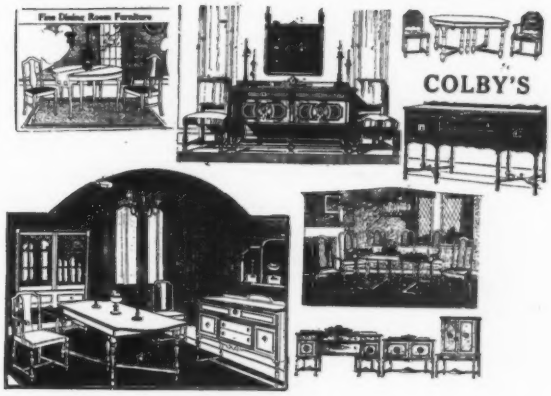
Newspaper Advertisements and Furniture Design

William H. Mulvey, Township High School, La Salle, Ill.

THE main object of a course of furniture design in the high school is to create a feeling for better and more artistic types of furniture and to raise the average standard of home furnishings from the barren, stiff, homely, and plain types to those having at least a tinge of cheer, comfort and good taste.

Advancement in any line of endeavor lies only in our ability to use suggestions which may come to us from various sources. This is as true of the designing of furniture as of anything else. Every new design worked out by the amateur or professional designer has been influenced by some outside aid, however remote. The success of new designs, then, depends in a large measure upon the source of the influences.





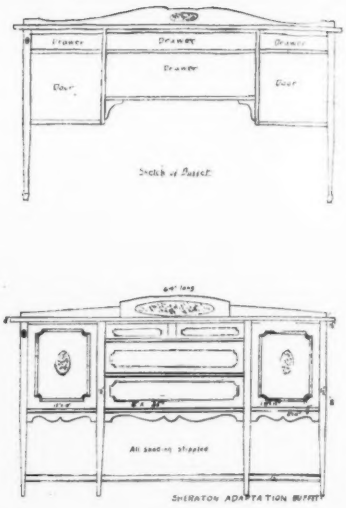
TYPICAL GROUPS OF NEWSPAPER CLIPPINGS USED BY STUDENTS IN STUDYING AND DEVELOPING DESIGNS.

WRITING DESK.

DINING TABLE.

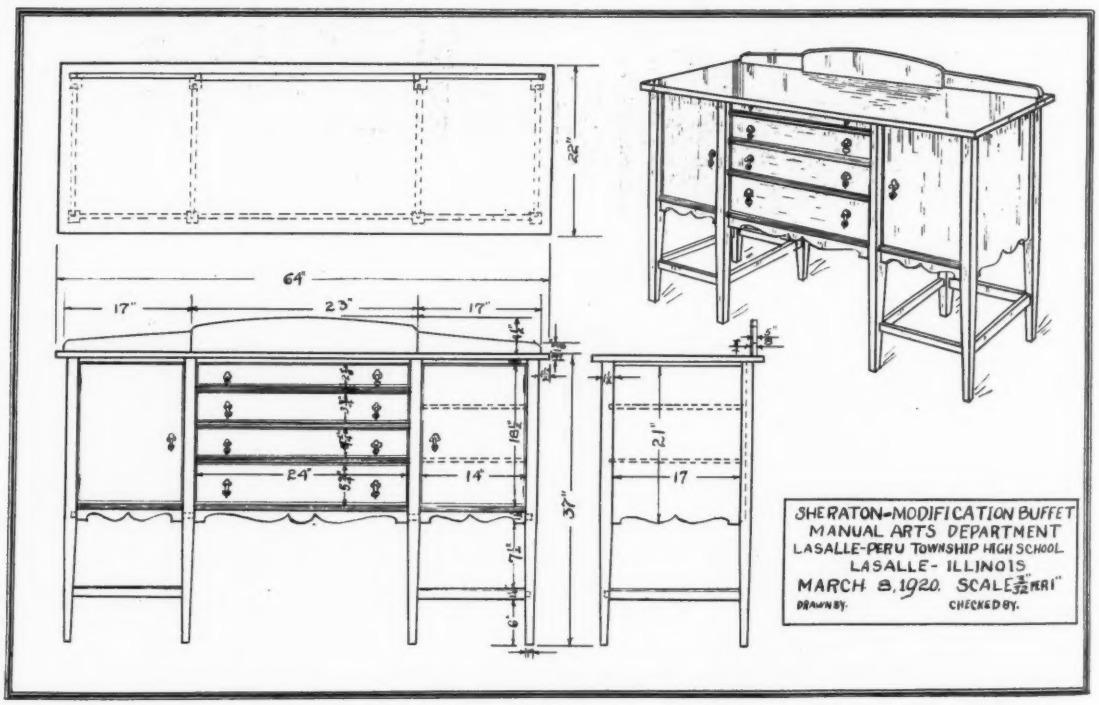
DINING TABLE.

STUDENT'S BUFFET.

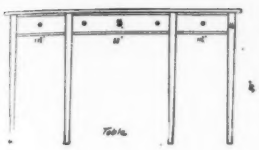


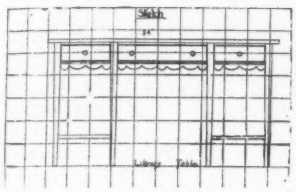
STUDENT'S SKETCHES FOR BUFFETS. THE LOWER DESIGN WAS DEVELOPED INTO THE BUFFET ILLUSTRATED AT THE LEFT.

In order to get successful design from a student, it is necessary to fill him with good ideas even to the saturation point. Instructors in design work know how difficult it is to get good up-to-date subjects to help create seemingly new ideas in furniture. Probably there is no better, or more accessible source for well chosen designs of present-day furniture, than the high-class advertisements in the daily metropolitan newspapers. And investigation will show that such advertisements are rich with excellent suggestions which will go a long way toward bringing about success in school design and furniture building.

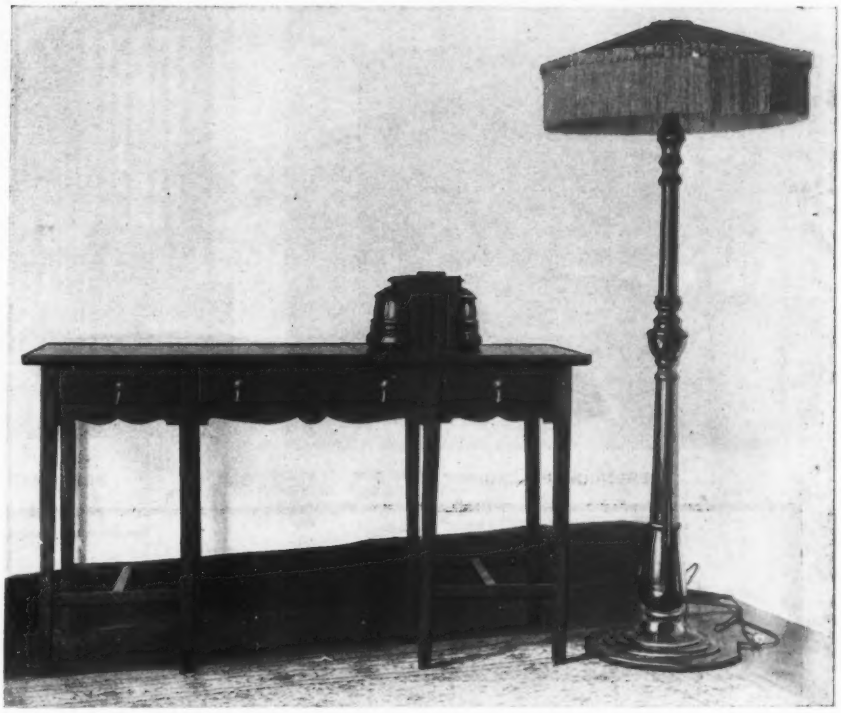


DETAILS OF BUFFET ILLUSTRATED ABOVE.



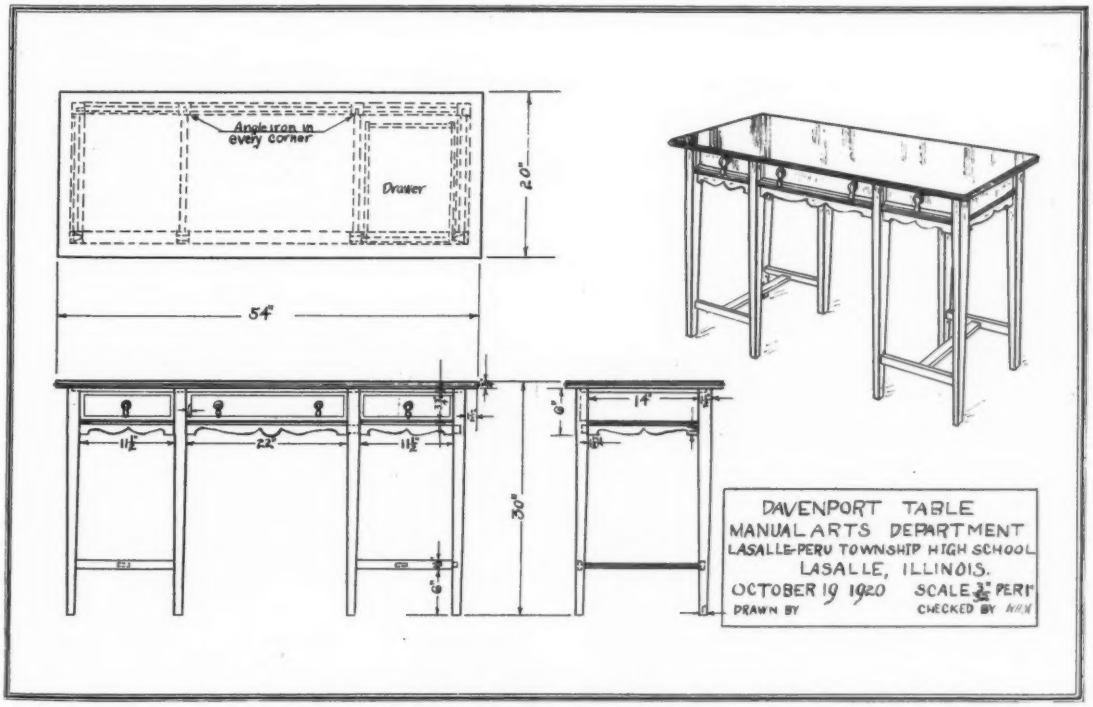


SKETCHES FOR TABLES. THE ORIGINALS ARE IN FREE-HAND PENCIL OR PEN ON SQUARED SKETCHING PAPER.

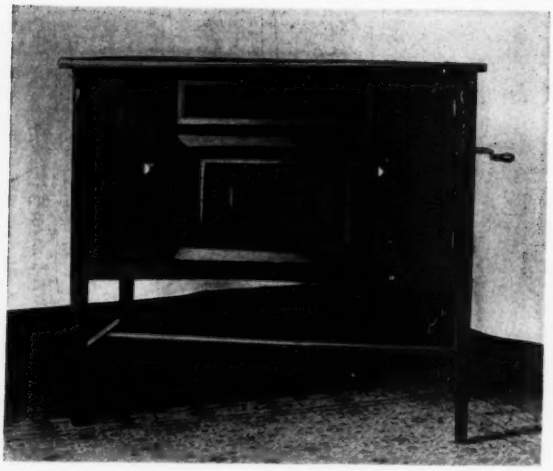


LIBRARY TABLE AND LAMP BY STUDENTS.

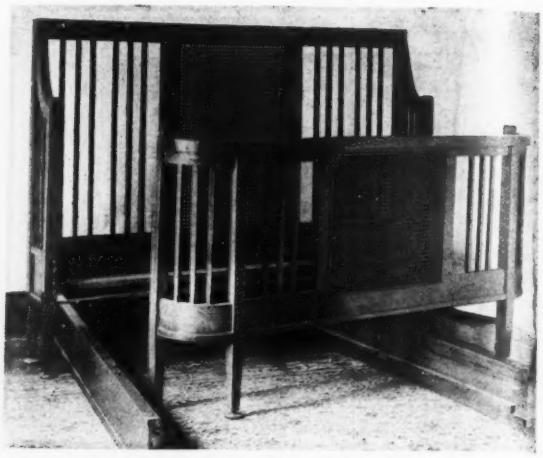
The accompanying illustrations will serve to show how ideas gained perhaps from several different advertisements, may finally be incorporated into one new design. A number of stages of development had to be passed through before the new design was ready to be created in wood. First a number of good advertising cuts of the project to be designed were studied from every angle. Freehand sketches without thought of dimensions, but giving special attention to proportion and balance, were then worked out. To these over all



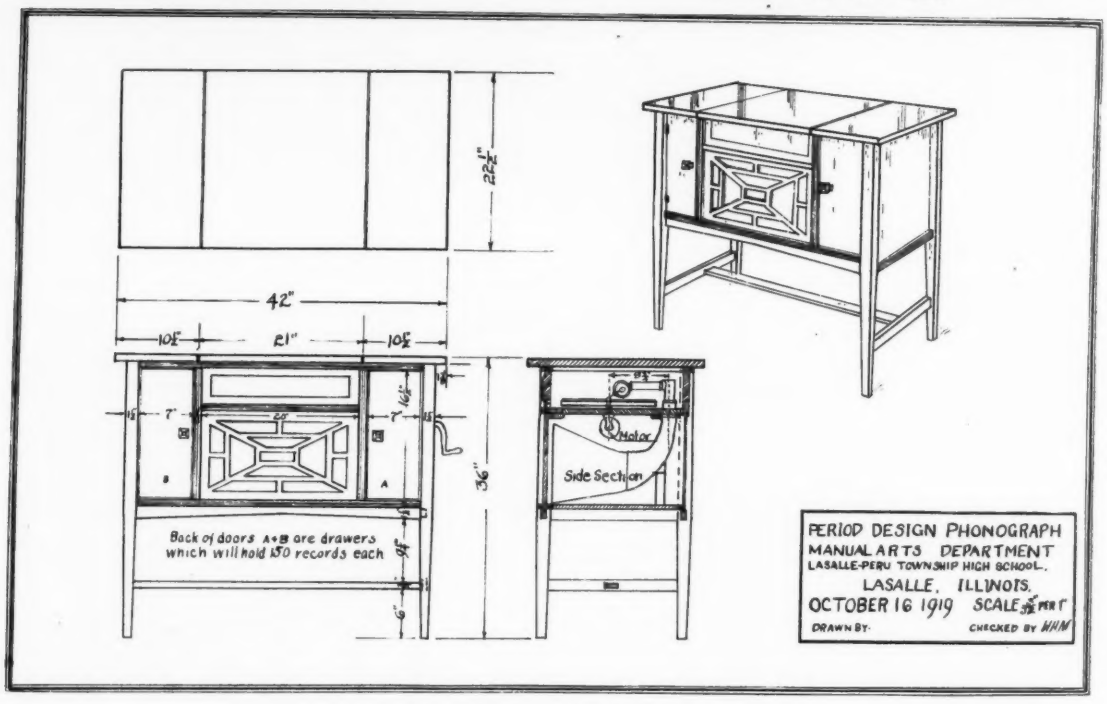
DETAILS OF TABLE ILLUSTRATED ABOVE.



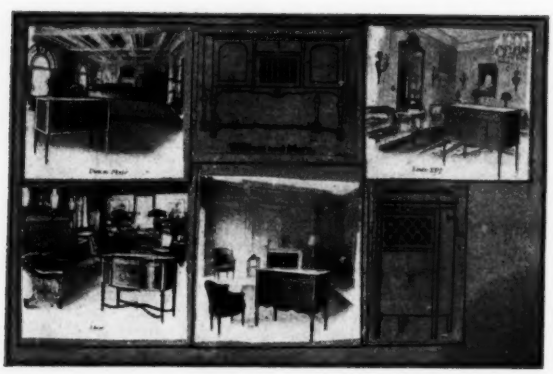
PHONOGRAPH CABINET.

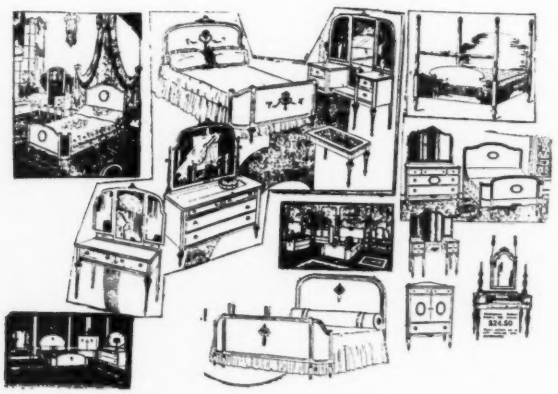


BED STEAD (See Next Page)

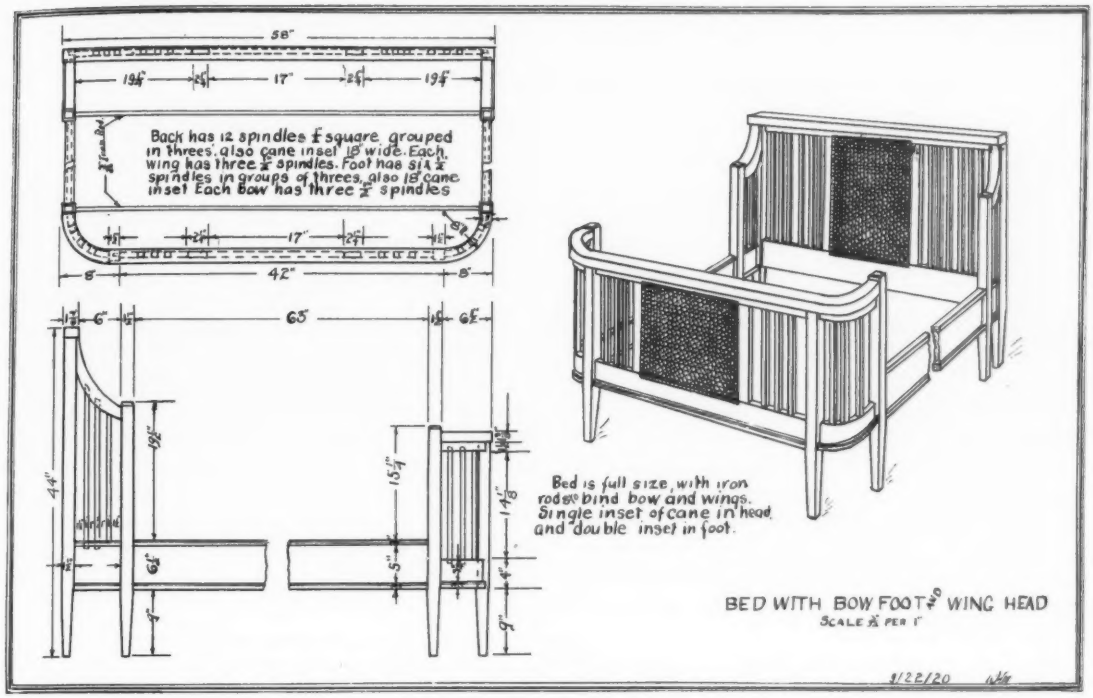


DETAILS OF PHONOGRAPH CABINET.





TYPICAL NEWSPAPER CLIPPINGS USED BY STUDENTS TO DEVELOP THEIR DESIGNS.


58"
19¼
17"
19¼
Back has 12 spindles ½ square grouped in threes, also cane inset 18" wide. Each wing has three ½ spindles. Foot has six ½ spindles in groups of threes, also 18" cane inset Each bow has three ½ spindles
42"
8"
8"
65"
6"
6½
44"
15¼
Bed is full size, with iron rods to bind bow and wings. Single inset of cane in head and double inset in foot.
BED WITH BOW FOOT & WING HEAD
SCALE ½" PER 1'
1/22/20

BED STEAD (See Page 106).

dimensions were later applied. When the desired type of design had finally been worked out, a true scale mechanical drawing, also a detailed drawing, was made, and from this a mechanical perspective drawn, so that some idea of the appearance of the finished projects was gained. The designs shown are all adaptations of the Sheraton Period, but any period furniture such as Adam, Queen Anne, or William and Mary, will lend itself as easily to such adaptation.

Many of the designs worked out in the drafting room were taken to the woodshop to be actually worked out in wood. Any desirable material may be used in the working out of these projects. In the case of those shown black walnut finished in the natural, having a coat of filler and five coats of varnish rubbed to a satin finish, was used. Another finish found to be very successful on walnut is the following: Materials used: one ounce of green nigrosine powder, dissolved in one gallon of lukewarm water; one pound of white lead; one-fourth pound of carbonate of zinc ground in japan; thin white shellac, and rubbing wax. To finish, sponge the project with water to raise the grain, sand with 00 sandpaper, then apply the stain, allowing it to soak in well; let dry, after which sandpaper lightly with 00 sandpaper. Next give a very thin coat of white shellac, sand lightly when dry, dust off with a stiff brush. Mix thoroughly carbonate of zinc and white lead, thin with turpentine, apply a coat to work, covering only enough at a time so it can be rubbed off before drying, leaving the pores of the wood white. Allow this to dry 24 hours, then apply two thin coats of white shellac, carefully sanding each with 00 sandpaper. After this, apply several coats of good rubbing wax, rubbing to a good finish. This is a very good finish for dining room furniture because it will stand up without marring.

The drawings and photographs will show the general methods used in the construction and decoration of each project.

The number of designs which may be worked out by such methods is unlimited. Such a procedure brings not only appreciation of good design but strong development of technique in drawing and construction, thus making it doubly worth while.

CHAIR MADE BY STUDENT.
A drawing of this chair and of a straight back dining chair will appear in an early issue.

Standards for Mechanical Drawing in High Schools[1]

John H. Sharda, Chairman of Committee, West Frankfort, Ill.

At the 1921 High School Conference, in the state of Illinois, held at the State University there were given three papers on Mechanical Drawing; its value, and the need of standardizing its content, and methods of instruction. At that meeting a committee was elected to take this subject in hand more fully; to make a thorough investigation and study of the matter, and to make at the Conference in November, 1922, a report on "Some Workable Standards for Mechanical Drawing in High Schools."

The committee begs to report that the investigations have been carried on over practically the whole United States from east to west, and from north to south. They have considered the matter from the viewpoints of the manufacturer and the industries, and from the viewpoint of the schools. They have considered the needs and demands of our universities and technical schools, and have not overlooked the student who will never see college.

Some Startling Facts.

From these investigations the committee has arrived at a number of facts and conclusions that are quite startling, to say the least. Practically every state in the union is today facing the same problem that we are. They would all eagerly welcome a solution. No state seems to have a sound uniformity of content in mechanical drawing courses. If any attempts are made at standardizing, those attempts seem very weak, vague and indefinite. Rarely are two cities found to have the same content of courses. Practically no two have the same methods of instruction. The technical schools and the universities complain that, although our students have apparently done considerable drawing, they don't understand what it is about. They do not seem to have acquired that insight,—understanding—thinking power, which is of prime importance. Since our drawing courses vary so exceedingly, these universities and technical schools are absolutely "up in the air" as regards knowing upon what they may depend. And for that reason these same higher institutions are more or less reluctant to allow entrance credits upon a subject which is so indefinite. Our manufacturing industries too often find our mechanical drawing products very unsatisfactory. Too often they must take our socalled draftsman, and "re-train" him. The commercial and industrial methods and customs do not "connect up" with those of our schools. Or, perhaps expressing it better, we do not "connect up" with them.

Our Subject And Our Problem.

The above mentioned facts and conclusions then indicate very clearly our subject and our problem. Mechanical drawing is a subject of tremendous potential value, but it must function properly. To do this, it is very necessary that we understand it properly. We must have, furthermore, a reasonable uniformity of content in our courses. There must be a standardizing of final results. To secure this, there must be clearly defined principles of teaching. We must teach according to the needs and the customs of our manufacturing and building industries. Our teaching must prepare for the needs and demands of the higher technical institutions. In short, we must set workable standards for mechanical drawing; standards that aim at the proper functioning of the subject. And we must make these standards so practicable and so well defined that you can take them with you for immediate application. It has been our earnest desire so to do, in order that these standards may begin at once to establish our subject in its proper value, in our high school curriculum.

The Real Significance of Mechanical Drawing—A Vision.

We usually think of mechanical drawing as a subject practical, vocational; a preparation for engineering, architecture and general lines of industry and manufacture. But we must not overlook the fact that our subject in a larger sense must justify its existence from another viewpoint as well. We say "in a larger sense" because, to be truly a high school subject, any study must have more than merely a utility value or a vocational value. If education is the full development of the individual, it follows that a high school subject is of larger value if it does more than only to train in knowledge or technical skill.

But when we assume as the general aim and end of mechanical drawing the following objectives:

1. A training in creative imagination,
2. An ability to think in three dimensions,
3. Ability to visualize quickly and accurately,
4. The forming of clear mental images,
5. A thorough acquaintance with the great industrial language of the world,
6. A technical skill to express one's self in that great language,
7. A sound elementary preparation for the needs of the manufacturing or structural industries,
8. The laying of a sound and well defined foundation upon which our engineering and technical schools may build,
9. The forming of a great stock of ideas conducive to a better understanding of the industrial world,

—then, surely, our subject needs no further justification.

Our high school curriculum is composed of courses that are selected for their mental training, mental discipline, cultural value, informational value, technical value. They must, in some manner, contribute toward

[1] This paper constituted the report of the Special Committee on Mechanical Drawing Standards for High Schools which was presented at the last meeting of the High School Conference of Illinois held in November, 1922, at the State University, Urbana, Ill. The committee included the following:
John H. Sharda, Chairman, West Frankfort, Ill.; A. B. McCall, Springfield, Ill.; H. J. Hawkins, Danville, Ill.

the development of the mental equipment of the student. And the student should be a "larger" individual, —more competent—mentally and morally, because of having pursued such a study or such a course.

If now then, on the basis of the objectives previously mentioned, it is demonstrated that mechanical drawing would satisfy the conditions implied in the foregoing discussion; that is, if it were taught properly, then it is likewise demonstrated that the subject is justly entitled to an important place in the schools of our state.

Shaping Our Work.

If now our vision is correct, and we believe that it is; and if the objectives mentioned are to be attained, there should be some well defined milestones along the way. And the road to these milestones must be paved with materials of standard proportions and quality. Furthermore, the road bed must be kept constantly in good repair.

And when our classes travel this road, they should arrive at a given milestone in a given time. Even though they might be permitted to make short side-trips along the way, we must make certain that they travel the highway, and that they arrive at the stations "on time."

Mechanical drawing is a language. It is the great language of industry and manufacture. Everything we have about us: our buildings and our bridges, our houses and our streets, our water works, and our sewer systems, our electric light systems, our machinery and our furniture, our big engineering projects, our mines and our canals, the dishes from which we eat, the stoves upon which we cook, the very clothing that we wear,—all these had to be expressed in the great language of draftsmanship; aye, their very existence depended upon this language.

Now a language should be taught by certain well defined principles. Just so, this big industrial international language must be taught by certain well defined principles. We must know the parts of speech of that language, and we must learn to express ourselves in that language. We must bear in mind that there are both correct and incorrect forms of expression. We must realize that no language can be mastered by merely copying page after page of that language. You all realize very well that no one could or would learn Spanish by copying chapter after chapter from some Spanish book. Yet some of you are doubtless guilty of assuming that the great language of construction and industry can be readily learned by merely copying plate after plate of drawing.

We would all agree unanimously that it were folly to attempt to teach a language by devoting the entire time of a class to copying. What would we think of a teacher who devoted the whole time to learning merely parts of speech? Or of another who devoted the whole year to writing just one certain type of theme? Certainly we should not hesitate to condemn these practices as extremely unwise and un-pedagogical. Yet in spite of this a great many teachers of mechanical drawing are guilty of just such misdemeanors.

Content of Various Courses And Methods Of Approach.

From an extensive amount of investigation, both by personal visits and by correspondence reaching over practically the entire United States, it is apparent that no state seems to have any degree of uniformity in teaching the subject. Nor is there apparently any uniformity of content in courses offered. No two teachers seem to handle the subject in the same way, nor do they agree upon the ends they seek. A great many teachers are self taught. They wander aimlessly, and they know not whither they wander.

We find the following peculiarities in the content of various courses offered:

1. Some are merely a set of plates to be copied.
2. Some devote all time to laboratory work.
3. Some begin with geometrical constructions and dead technicalities.
4. Some discard theory altogether and begin work with large detail drawing.
5. Some use considerable theory, require taking notes, but make little application of these theories.
6. Some advocate an extensive use of models, while others discard models entirely.
7. Some consume two thirds of a year with sheet metal drafting, when probably not a single member of the class will ever use it.
8. Some, in the drawing done by their class in woodworking, require drawings of a lot of iron objects which the student has never seen and which he does not understand.

The textbooks on the market today also show the same variety of content and method of approach. Doubtless it is because of this fact, indeed, that teachers have inaugurated such a heterogeneous collections of drawing courses. There is only one instance of uniformity in the textbooks offered today, apparently, and this uniformity becomes, indeed, a monotony. After each author has aired his individual theories on the subject, he almost invariably offers a series of problems on models so antique and so impracticable, that although they would be the envy of a junk man, they have no live meaning to the student.

And now, out of this miscellaneous material what shall we select and what shall we build? We must bear in mind two things. The new structure that we desire to erect must comply with the requirements of two big objectives:

a—It must justify its worth on three points:

1. Information
2. Mental training
3. Cultural value

b—It must prepare for practicable usefulness, whether applied at home or toward higher institutions.

Proposed Content.

Comes now then the problem of content of courses in the different years:

a—In connection with manual training woodwork;

b—As offered in Mechanical Drawing I, or first year's work as an independent subject.

c—As offered in Mechanical Drawing II, or second year's work.

Inasmuch as our state university does not give credit for more than two years' work in drawing, we are limiting our proposals to two years of work. However, we very earnestly hope that, if our plan may bear good fruit, we may be able to offer, before long, three and four years of mechanical drawing, and that our universities will recognize the work.

Drawing In Connection With Woodwork.

In discussing Division A drawing, in connection with shop work, it is necessary to take note of the following conditions:

There are 36 weeks in a school year.

If we devote an average of two days per week to shop drawings, there will be a total of 72 days. This committee believes that for this period of time, 25 plates is a sufficient number. We recommend that these plates be of some standard size, say 11 by 15 inches, or one fourth of an "imperial" sheet. These plates should be closely related to what the boy does, or will do, in the shop. The technique and lettering should be reasonably neat, but it must be borne in mind that this drawing is only in conjunction with shopwork, and is not an end in itself.

We would especially emphasize that the work given be closely related to the shopwork. It should consist of drawings of woodwork; objects that the boy understands; objects which he may make some day. To us it seems extreme folly to have a boy today working on a bookcase or pedestal, and tomorrow have him attempt to draw a gland or lap strap about which he has no conception whatever.

We would further recommend that, of the 25 plates allotted to this year, 60 per cent, or fifteen plates, consist of orthographic projections or common working drawings; and 20 per cent, or five plates, to oblique drawings; and 20 per cent, or five plates, to isometric and cabinet drawings. This completes the 25 plates.

Superimposed upon this should be a small amount of freehand sketching. This latter is valuable ability for the student to have and to practice. He may see some object which appeals to his taste or inclination. It may be in a store, in a catalog, or in some book or magazine. Given the ability to sketch it, he can carry the design with him to school and make a drawing of it. Designs will begin to appeal to him; lines and proportions will be observed; we are cultivating something in that boy's mind which means a valuable asset to him, yet we do so without apparently teaching.

Mechanical Drawing—1.

In this year's work, which we shall interpret to mean the first year of mechanical drawing as a separate subject, there are several other conditions and obligations to be considered. Our universities and technical schools have certain needs and certain requirements. We must aim to supply them with what they want and can use. We must consider the needs of the great industrial world, and we must meet that need. Then there are always some students who can not continue their education, and who hope to be able to apply what they have learned; to apply it toward earning their living. Truly a big problem!

To come as near as possible to meeting these requirements we suggest that the work of this year be arranged in six groups as follows:

Group 1. To consist of all general preliminaries in technique, including lines, circles, curves, angles, plane figures, definitions, scaling, etc.

Four plates allotted to this group.

Group II. To consist of the revolution of solids in different positions and at various angles, developing the ideas and methods in projection of various views. Approximately fifteen plates allotted to this group.

Group III. To consist of working drawings and orthographic projections. Some instructors might suggest placing this group before group two, but after studying the matter from practical observation for a long time, we conclude that the student has a more competent grasp of ideas if he has had group two, first. The objects to be drawn in this group should be both of wood and of iron; should be of a kind that are understood; should be modern and related to modern industry; should be selected with a view of arousing interest and paving the way for larger things to follow. Models might well be used at times, though by no means for every problem. Some twelve plates alloted to this group.

Group IV. To consist of fairly simple oblique, isometric, and cabinet drawings. Five plates allotted to this group.

Group V. To include intersections and development of surface in an elementary form. Only three plates allotted to this group.

Group VI. To consist of freehand sketching of objects in different positions. A plate may easily have four or more views of the same object or it may contain views of four or more different objects. Two plates allotted to this group.

For general characteristices, qualities, and points to be observed in this whole year's work we would make the following suggestions for requirements:

That standard size plates be used, preferably on sheets of paper twelve by eighteen inches.

That standard lettering be rigidly insisted upon, qualifying both in neatness and in rapidity, and that the slant Gothic alphabet be given preference. The trend of the industrial world seems to be toward this style of lettering.

That standard thicknesses of border lines, visible and invisible object lines, center lines, projection lines and dimension lines, etc., be taught and rigorously demanded.

That a properly logical order of procedure relative to rapid lay-out of border rectangles, lettering strip, lay-out of views and order of penciling be so thoroughly taught that there will be a rapid formation of proper habits in technique.

That inking of *all* drawings is not at all required; in fact that it is not wise. Of course students must be required to develop a satisfactory degree of skill in inking, but when this skill is attained, a great deal of valuable time is consumed and really wasted by having students required to ink each and every plate.

We recommend that, when students have once attained a satisfactory skill in the technique of inking, they be frequently required to rapidly block out a plate with a 5 H pencil, after which they should complete the work with, say, a 2 H pencil, just as they would with their ruling pen. They should be taught to produce a drawing of practically the same degree of neatness as an inked drawing. We would like to have drawing teachers take note that in commercial drafting room practice the great majority of drawings are never inked. They are penciled in with a rather soft pencil, say a 2 H, all unnecessary lines are erased, perhaps, and a tracing is then made of the drawing. In fact, even the tracings made, when made upon tracing paper, are in the majority of cases also made with soft pencil instead of with ink. The reason is very apparent. Time is saved, the work done is fully as neat, and blue printing is no less successful. Only when tracings are made upon tracing cloth, is ink used in many drafting offices.

Mechanical Drawing—II.

This is not to be interpreted as the year's work following the drawing with woodwork, but is the second year's work in mechanical drawing as an independent subject.

Just as in the previous year, we would arrange the work in groups, and again we would suggest six groups. And as a general quality of the work if this year we shall expect a finer and more finished degree of technique than we did in the first year's work.

Group I. To consist of intersections, development of surfaces, sheet metal drafting. Six plates allotted to this group.

Group II. To consist of fundamental geometrical problems and constructions. Such as the instructor knows to be later needed by the student when the work is continued. Five plates are suggested as a proper allotment for this group.

Group III. a—To include cabinet making drawings, both detail and assembly; both orthographic and oblique or cabinet projections.

b—Also to include isometric drawings of standard shapes and figures. Five plates allotted to this division.

Group IV. To consist of drawings of standard machine parts and conventions. It is earnestly urged that parts selected be standard parts of modern machinery; parts that are observed very commonly. Models should be used for some of the drawings. Conventions taught should be selected from standard handbooks on machinery. The student is building his machine vocabulary, and only correct forms must be allowed. Some eight plates should be allotted to the group.

Group V. This group to include screws and screw threads, with the fundamental principles concerning screws. The instructor should plan such work as in his judgment would lay the proper foundation for future work. We would emphasize the conventional representations, and we would caution against too much tedious work on spirals, etc., which any standard handbook on machinery has already conventionalized and tabulated. Some three plates suggested for this group.

Group VI. In our last and final group we would include a selection of machine assembly drawings. We can now draw upon, and appeal to, the fundamentals and principles learned thus far in the course. It is well to have this group serve as a culmination and as a final application of the knowledge and skill gained by the student. Some three plates to be made in this group.

Conclusion.

Now then to recapitulate briefly: We have discussed standards and standardizing. What shall we understand by "standards"? Do we mean standards of courses, standards of teaching, standards of ability or standards of results? Is it not true that these are all inter-related and that each depends on the others? We have discussed mile stones and objectives; we have proposed contents of courses. It is our opinion that the following stand before us clearly as essentials.

(a)—We should have a clear and well defined idea of what our subject is, and of the ends toward which we strive.

(b)—We must have a well defined uniformity of content in our courses, yet provide reasonable flexibility to meet local conditions.

(c)—There should be some clear cut principles to govern and guide our teaching. Originality and initiative is not to be suppressed, but the general framework of our scheme of instruction must be pedagogically sound.

(d)—There should be a fair and reasonable degree of uniformity in the results that we secure. It is absolutely necessary that those results are what is needed by the industrial world and by our technical institutions. It is just as necessary that those results be uniform.

If now we can get away from the conglomerate mass of variegated courses, methods and texts; if we can shape our work along certain well defined lines; if we can fix the amount of that work so that it can reasonably be accomplished; if the high schools of the state can, and will make, their courses reasonably uniform and similar; and if the results secured will also be uniform and of standard quality; then at last will mechanical drawing come into its own.

The committee has, therefore, made bold to offer the foregoing suggestions. They have endeavored to outline the work according to the needs of the time, and in a way that will meet with the approval of our higher institutions.

It now remains for the teachers of drawing throughout the state and nation to give their constructive criticism and their cooperation. And if this last can be secured; if we can unitedly "put it over," we shall have succeeded, in a measure at least, in doing what many states would like to do but which none have as yet done.

HOUSE MADE BY MANUAL ARTS CLASS, IOWA CITY (IA.) HIGH SCHOOL.
A. P. Twogood, Instructor.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN

Editors

EDITORIAL

A GREAT TEACHER.

Professor Arthur Wesley Dow died on the thirteenth of December in New York City.

No teacher has contributed more than Professor Dow to the betterment of art instruction in the public schools of the United States. His many students will cherish his instruction and influence as their most valued preparation for the subtle task of art education.

Professor Dow brought to the art instruction of this country a much needed emphasis on composition and a clearly defined means of using it. Curator of Japanese Art in the Boston Museum of Fine Arts for several years, Professor Dow acquired a profound understanding and appreciation of the arts of the east. This understanding and appreciation was passed on by him through many years of teaching at Pratt Institute and Teachers College so that no large and few small school communities in the United States are without some of the rich influence of his unique and effective instruction.

The influence of his quiet, reserved and lovable personality will continue to strengthen his followers in the great task of enriching life with Art.

INTERPRETING SURVEYS FOR GUIDANCE PURPOSES.

Every little while an enthusiast in any field comes upon a disconcerting fact or condition. Just recently in Detroit a most interesting fact was brought out by a survey made by the department of vocational guidance and advisement. In a large area of the city where the fathers were practically all employed in automobile work, only one boy signified his intention of entering automobile work of any kind.

Judging from their environment, their fathers' occupations, and the history of their school associates who leave school and go to work, the strong probabilities are that when the boys who, according to the survey, preferred everything in the world to automobile work, actually do get employment, they will find themselves in the automobile industries.

When it comes to choosing an occupation in early life, perhaps there is some truth to the theory that "familiarity breeds contempt" and "distance lends enchantment."

Such findings as that indicated above do not mean that a survey is worthless or that the expressed likes or dislikes of immature boys are wholly unreliable. They rather indicate that the adviser must *know how to interpret his findings.* He must evaluate the individual's attitude toward work in the light of the various facts, influences, and experiences which have helped to form his conclusions.

An early expression of interest in a certain occupation may indicate simply a bent of mind or trend of thought, which points toward a certain broad type of work which may or may not be best typified by the occupation selected.

Then, too, familiarity with the disagreeable features of an occupation sometimes turns the choice of a student to occupations whose disagreeable features are less familiar to him.

The best that an investigator can do is to understand all the factors that enter into a boy's attitude of mind and his expression of a desire or choice in connection with his future work. Then he can *interpret* his findings and the pupils' expressions in the light of these factors that bear on the selection of a life's work. The schools should see to it that sufficient data are furnished pupils concerning common occupations to make intelligent choice at least possible.

PATTERN-MAKING AS AN INDUSTRIAL ART.

It is doubtful whether any other form of wood working so completely meets the requirements of an industrial art as does pattern-making. An industrial art must at least meet the following requirements:

1. It must contribute in some way to the satisfaction of some need on the part of the individual or the social group.
2. It must demand some degree of mechanical skill.
3. It must require accurate, logical, and constructive thinking.
4. It must have industrial significance.

In the experience of every boy abundant needs may be found for metal parts for toys and other mechanical necessities of boy life, which may be molded of soft metals.

The making of the patterns for such metal parts, etc., requires considerable skill even for simple pieces. The objection raised by a great many mechanics against pattern-making in the grammar grades is that such boys haven't the skill. But patterns can be selected and designed easily within reach of the skill of a seventh or eighth grade boy.

There is scarcely any line of mechanical work which requires such a high order of consecutive thinking as pattern-making. In the first place, it necessitates the most concentrated attention and thought to read a drawing and interpret it in terms of a pattern. Then it requires another and a more difficult step to think through the pattern to the casting which is to be produced from the pattern. From the standpoint of the thought required, pattern-making is a highly superior subject.

When it comes to the last point of industrial significance, pattern-making is the equal of any subject in the technical curriculum. It lies at the basis of practically all metal working industries. The pattern

is the common factor in all the metal shops. In making a pattern and the casting from it even in soft metal, one gathers a good deal of the whole industrial process in metal manufacturing. One likewise learns something of the composition and characteristics of metals.

Pattern-making, therefore, meets in a very remarkable way all the requirements of an industrial art. It deserves a much more prominent place in our schools than it now occupies.

AGRICULTURAL WORK.

For a long time the vocational associations and the discussions of vocational education paid but little attention to agriculture, although agricultural education was very much in advance of many other phases of education. This may be due to the fact that agriculture is largely a science and its main content is informational in character. The industrial trades, on the other hand, are in the nature of arts and their content is largely skill whose acquirement is a highly specialized process. When one does a piece of laboratory work in agriculture, one is not interested primarily in the process, the technique, but rather in testing out certain principles or formulae.

Now, perhaps the greater part of the real vocational education that is going on in this country is of an agricultural nature. Agriculture lends itself very effectively to instruction since it is a laboratory science and since its appeal is to a perfectly definite group. It presents specific economic and social problems that can most effectively be worked out on a project basis. It correlates in almost an ideal way with the home life and work. Many a high school boy is now carrying on in his own home projects of crop production, soil fertilization, stock raising or market feeding, or projects in farm mechanics. These are but the laboratory experiments with the principles and information which the school furnishes. He reports his progress to his teacher who visits his home, inspects his project, and offers criticism, encouragement, and advice.

Other phases of vocational education may well profit from the experiences of agricultural teachers in the organization of material, the effective use of the project, and the coordination of school life and interests with those of the family and the home.

THE "PROFESSIONAL" APPEAL.

The appeal to one's professional interest and pride is a very strong and effective one. It is a great pity that such appeals are sometimes made to further personal ambitions.

To make an appeal "for professional reasons" for the support which cannot be *commanded by merit* seems to us to be entirely unprofessional. It certainly could not be regarded as very professional in the furtherance of a personal enterprise to resort to practices which ordinary business integrity would not countenance for a moment.

We are always just a bit doubtful about the man or the enterprise that insists on a "professional" handicap. We believe in the doctrines of *service* and *merit*. We have found them efficacious in our own field, and we heartily commend them as safe and dependable guides both in business and in professional matters.

TRAIN THEM ALL.

One teacher of Art writes: "When I think of our beautiful new school building spoiled by pipes placed in the main entrance, I know that plumbers need art training."

From this statement one might conclude that plumbers should be trained in art so that their works might be hidden and that the unhappy plumber might follow the paradox of showing his art by hiding his work. One other conclusion might be that plumbers should be trained in art so that they could make plumbing beautiful and suitable to the entrance of a fine building.

It is probable that the difficulty was not due to the plumber as a plumber but as a citizen who should be interested in the design of a public building. The architect of the building was directly responsible. The school board who chose the architect was little less directly responsible than the architect and the citizens who chose the board were indirectly responsible. The only way to avoid such blunders is to train the architect, the board, the citizens and the plumber. They must all be trained in Art.

AN AMERICAN PROBLEM IN DESIGN.

Exhibition has been made recently of over one hundred efforts by architects from various countries to design an American skyscraper. The specifications for the designs were identical yet no two of the designs were identical. One who is well acquainted with the architecture of each of the various countries represented can distinguish the designs of each country without looking at the signatures. One who is well acquainted with each of the historical styles in architecture can find in this collection examples of each.

Even Oriental ideas are in evidence. Gothic is prevalent and the various adaptations of Classical design are used frequently.

The American designs were most variable in style but most significant of the unity required in such a monumental structure.

Only a few "freak designs" are submitted which speaks well for the reserve and serious purpose of the architectural profession in distinction to painters and sculptors. Perhaps the most interesting phase of the designs were the attempts on the part of foreign architects to design a building foreign to them. A business block in the proportions of a great cathedral was a problem they could not visualize.

A Greek or Roman temple on top, or at the bottom of many stories of steel looked no better or more appropriate when designed by a foreign architect than such misconceptions look in actual buildings of our American cities. Our American architects are for the most part developed beyond this misconception. The designer must be steeped in historical traditions and styles but must never be a slave to them.

Cement Work as a Therapeutic Occupation for Men

Louis J. Haas, Bloomingdale Hospital, White Plains, N. Y.

(Continued from February.)

PLATES Nos. 12 and 13 show the plan and elevation with details of construction, and the molds and template used in constructing a small concrete fountain. At the bottom of Plate 12 is also shown an elevation, partially in section, of a basin with overflow and nozzle arrangement for an intermittent geyser fountain which will be explained later. The fountain represented a rather large undertaking which had to be planned for far in advance, and employed the interest and activities of a number of men, working at different times on the parts needed to compose the completed fountain. It was decided to make the outside face of the basin in the form of a wall, rising out of the ground three inches, with an overhanging lip above this whose vertical face was four inches. The rim of the fountain basin was placed at about seven inches above the sod level. The section thru the fountain basin explains clearly the contour of its construction. In accordance with this design the eight mold boards were constructed as shown by drawing "C" plate No. 13. The mold boards were held together by sixteen straps of 1"x¼" iron, bent to the proper angle and drilled to receive four screws each. The elevation drawing of the fountain, (Plate No. 12) shows the proper placing of the angle straps.

The templet (drawing "a", Plate 13) was constructed of a one inch oak plank, 14" wide. Its working face was bound with a strip of 1"x⅛" strap iron, held in place by screws. The iron strip facing the templet, was drilled and the holes countersunk, so as to receive the heads of the screws flush with its surface. Two strap eyes were forged (as shown in drawing "b", Plate 13) and fastened securely to the templet. As will be noticed in the section of the basin in process of turning (bottom of Plate 12) the templet rides around the supply pipe,

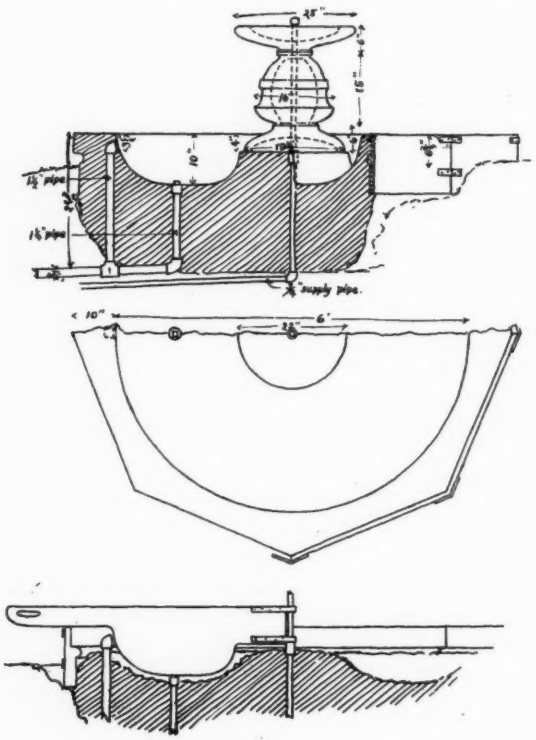


PLATE 12.

PLATE 12A. THE FOUNTAIN.

a pipe coupling being placed conveniently at the proper height to perform this service. When all parts of the mold were completed it was assembled and set in place, and stakes driven at eight points about one foot beyond the mold boards. The mold was then removed and the enclosure excavated to a depth of from 18" to 24", so as to place the foundation below the frost line. Then the trench was cut to receive the supply and overflow pipes.

The intake or supply pipe was a ¾" galv. iron water pipe, the perpendicular section of which occupied the exact center of the proposed basin. The overflow pipe, as will be noted, had two upright arms, one placed so as to be contained within the rim of the basin, and opening thru the rim at the proposed water level of the fountain, the other placed in the bottom of the basin, and plugged so that it might be used to conveniently empty the fountain, and completely flush it whenever it needed cleaning. These pipes being in place and anchored by placing several large stones about them, a foundation of broken rock was placed, so as to clear the swinging templet by about three inches at all points (see drawing at bottom of Plate 12). The assembled mold was then set in place, centered by the supply pipe and levelled.

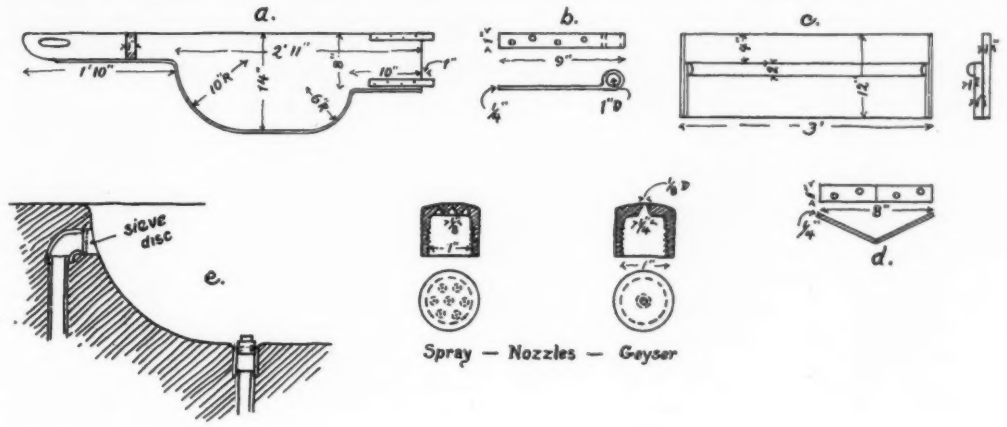
When the mold was levelled a quantity of concrete, a 6 to 1 mixture being strong enough, was poured over the arranged broken stone foundation and the whole built up to within about 1-½" of the working edge of the templet, and presenting a rough surface of about the contour suggested in the section of the foundation (as shown in drawing at the bottom of Plate 12). When the concrete had set, a cement mixture of 3 to 1 to which was added ten per cent of hydrated lime, was prepared. This mixture should be just moist enough to trowel freely. The cement was filled in as needed, and practically trowelled into place by the action of the templet. It will be seen that having built up the concrete and broken rock foundation, very close to the sectional contour of the basin, and to within 1-½" of the face of the templet, greatly facilitates the trowelling of the cement coat or face into shape by the moving templet. It was found the cement drew just enough water to make the templet float over the cement, trowelling it into a smooth even surface. Any excess of water that appeared in the trough of the basin was carefully removed and the trowelling continued until the surface had set sufficiently, to insure that it would not settle, or sag, when the templet was propped up in rest. It should be explained here, that the mouths of the overflow and flush pipes were

closed with pieces of waste, while the basin was being shaped by the templet. When the turning was completed, the waste was removed and a plug inserted in the flush pipe and the cement opening finshed with the trowel. On removing the waste from the mouth of the overflow pipe, a disc of brass wire mesh was cut the proper size to rest against the lip of the elbow and inserted to act as a sieve, and the opening in the cement wall of the basin finished off with a small trowel (as shown in drawing "e" Plate 13).

The basin was then covered to protect against accidental injury or a possible shower of rain. After setting three days, the cover and templet were removed and the surface of the basin thoroly sprinkled with water, to help cure and toughen it. When a week had elapsed, the mold boards were removed and cleaned for future use. The spray basin, with its supporting members, was set into place, the pipe passed through the holes left in the three turned pieces, to receive it; and locating the mouth of the coupling, the pipe was then screwed up tight. The opening through which the supply pipe passed up through the drip basin was then calked tightly with a little cement, and the fountain was ready for use.

little above the quiet level of the water of the basin, starts a full stream into the air about six, eight or ten feet high as is desired, the height being somewhat controlled by the amount of wind prevailing to divert the perpendicular drop of the water. The falling water agitates the surface of the water in the basin until soon it rises and falls in small waves. A wave covers the nozzle sufficiently to smother its flow for an instant only, and passing, the restrained flow of the water now shoots up to its full height, seems almost suspended in the air a moment as the next wave passes over the nozzle, and then this quantity of water tumbles down to be pierced often in its fall by the next rising gush.

Plate No. 9[1], shows a cement turning mill as it was built as therapeutic occupational work by the patients engaged in the carpentry and blacksmith shops to meet the need of cement turning. Cement turning is not a new idea, nor is the turning mill idea new, but the perfected mill is a big advance in the right direction. The apparatus usually used to turn cement in occupational departments consisted of two types, one a stationary table with a fixed central shaft over which the core was placed and cement stock tamped in place. An arm of wood re-



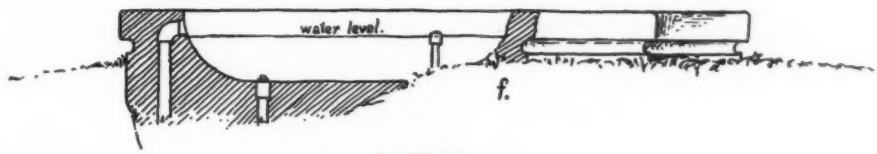


PLATE 13.

The nozzle, an ordinary pipe cap, was drilled with seven ⅛" holes, passing from the inside of the cap two thirds thru the thickness of the metal. A sharp steel punch was driven the rest of the way, so that when the slightly raised bosses were filed level with the face of the cap, there appeared seven clean-cut holes about the size of a small needle. This type of nozzle gave a beautiful delicate lace like spray at a very small cost in water.

The sectional drawing "f", Plate 13, shows the construction of an intermittent geyser fountain. This fountain differs only in the following respect from the one just described above: First, the templet is so constructed, that it will not leave the circular boss in the center of the basin. The water supply pipe comes up clean from the center of the flat bottom of the basin. This pipe is capped with the geyser nozzle which sends up one stream of water just ⅛" diameter. The exact height of the mouth of this nozzle had to be adjusted until it would perform properly.

In action what occurs is this: The nozzle being very

volved about this shaft. This arm had a long saw cut in it to receive a template and the operator walked around the table to swing the template and thus cut the piece. Each time the template needed to be fed in for a new cut this was accomplished with a tap of a mallet. The other type was a slight improvement upon the first. The table now revolved about a stationary axle to which the arm was fixed also stationary. The templet was placed in the saw cut in the arm and fed up in the same manner. The cement stock upon the table in the case was revolved towards the stationary cutting templet. The operator held the stationary templet with his left hand and with the right propelled the table of this crude mill. It was the last described crude turning mill that inspired the design for the mill shown in the drawings of Plate 9[1]. The gears used were parts of some worn out lawn mowers, the balance wheel was from a horse lawn mower, it being loaded with lead for this service.

[1]See January Issue, p. 17.

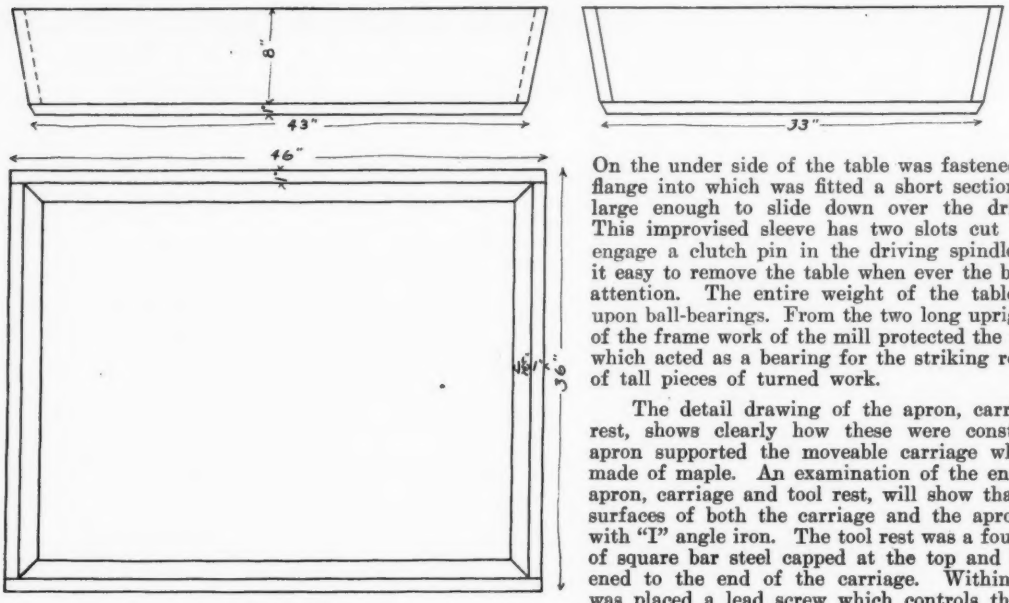


PLATE 14.

All parts of the mill whether of wood or of iron or of combinations of both were designed so as to be possible to construct with the equipment at hand in the blacksmith and carpenter shops of the Occupational Department. Those who may be interested in producing a mill and doing turned work will have to adapt this design to fit the constructional facilities they have at hand, just as we did, and therefore are most interested in how the mill functions. The plan views show it was built in the shape of an "L". In the longer member was hung two maple beams which were drilled to receive the shafts of the different gears of the train. The first gear was the propelling one, being keyed to the crank shaft. The fifth gear was keyed to a longer shaft which extended out into the short member of the "L" having fastened at its end a bevelled pinion. This pinion engaged the bevelled gear which was keyed to the driving spindle of the mill table.

The mill table was a circular disc made of two layers of wood laid cross grained, faced and edged with galvanized iron and drilled to receive the driving spindle. On the under side of the table was fastened a large pipe flange into which was fitted a short section of pipe just large enough to slide down over the driving spindle. This improvised sleeve has two slots cut into it which engage a clutch pin in the driving spindle. This made it easy to remove the table when ever the bearing needed attention. The entire weight of the table was carried upon ball-bearings. From the two long upright stanchions of the frame work of the mill protected the top stay brace which acted as a bearing for the striking rod of the core of tall pieces of turned work.

The detail drawing of the apron, carriage and tool rest, shows clearly how these were constructed. The apron supported the moveable carriage which was also made of maple. An examination of the end view of the apron, carriage and tool rest, will show that the bearing surfaces of both the carriage and the apron were faced with "I" angle iron. The tool rest was a four post column of square bar steel capped at the top and securely fastened to the end of the carriage. Within this column was placed a lead screw which controls the tool holder. Two stay bolts were placed one above and one below the tool holder, riding in one of the guide spaces (see detail drawing). These bolts were used to hold the templet stays and the templet itself, securely to the tool rest. The tool holder was used to carry small steel bars used to cut narrow and deep grooves into the surface of the finished pot, performing any service the templet could not. In a groove underneath the carriage was placed a lead screw which ended in a handle. This screw passed thru a lead bolt in the center of the apron thus controlling the movement of the carriage.

It is easily seen what may be accomplished with a turning mill so adjustable as this one. Usually two or three men were engaged in turning a piece of work; one guided the templet while the others furnished the motive power. This mill, could with slight change in its gears, be driven by a motor. One man could then operate it. Careful tests show that for cutting green pieces, that is those which have set from three to six hours, twelve to fifteen revolutions per minute is the best cutting speed for the mill table. A higher rate of speed is liable to crack the cement and cause whole sections to collapse.

Easter Bookmarks

D. Elizabeth Roberts, Philadelphia, Pa.

Hand-decorated bookmarks make dainty and appropriate remembrances for the Easter season. All children are interested in any kind of handiwork, and the designs illustrated may be easily worked out as class problems. Water colors and small pieces of cardboard or heavy paper of different colors are the only materials required for four of the bookmarks, while short pieces of ribbon are needed for the other two, and also a small print for one of the ribbon bookmarks.

The daffodil bookmark and also the one with the narcissus design were made of heavy cream-colored paper. These would be just as pretty made of white paper or any delicate color. The daffodil bookmark measured 7" by 1⅞", while the measurements for the narcissus design were 7¾" by 1¼". After transferring the design to the paper the flowers on both bookmarks were colored yellow and the leaves two tones of green. Then both designs were outlined with dark brown. The lettering was done in two colors, brown for the capitals and green for the small letters.

The iris design with the words, "Easter Greetings", was made of heavy white paper with a rough surface, the measurements being 7 by 2 inches. The flowers were colored in lavendar and the leaves in two tones of green. The outlining could be done either with India ink or water color. The lettering was done in lavendar and green, using lavendar for the capitals and green for the small letters.

The bookmark with the words, "All the glorious joys of Easter-tide be yours," was made of white paper mounted on a heavy rose-colored paper. It was 5¾" long and the greatest width was 2". The design was transferred to the white paper and the letters were outlined with India ink, and then filled in with water color to match the rose-colored background. If preferred, they could be first colored, and then outlined with water color. The connecting lines could be done either in ink or water color. The design was cut out like a stencil, and then the white card was pasted on the foundation of

DETAILS OF EASTER GREETING BOOK MARKS.

rose paper. If the cutting out process is too difficult for the pupils, the design could be painted and outlined.

The two ribbon bookmarks were made by running ribbon 1¼" wide through cuts made in heavy paper. The one with the print in the center was made of brown ribbon and heavy cream paper. The measurements for the paper were 4¼" by 2¼" for the greatest width. The piece of ribbon was about ten inches long and the ends were fringed. The print was first mounted on a piece of brown paper, to show a narrow dark edge, and then this was mounted on the cream-colored foundation. The small brown-toned print was cut from an ordinary post card. This would be attractive if colored with water colors or Japanese colors. The words "Easter Gladness" were painted light brown and outlined with dark brown.

The bookmark with the wording, "With Best Easter Wishes" was made of rose-colored ribbon and cream paper. The paper measured 4¼" by 2" for the greatest width. The buttercup design was cut as a stencil, so that the ribbon would show through the cut spaces. The lettering was done in rose color with the initial letters in gold, outlined with rose. If the process of cutting out the design is too tedious, the flowers, butterfly and leaves could be colored in bright tones.

These designs will suggest other ideas for bookmarks. After using the designs illustrated, it would be interesting to have the pupils work out some problems of a similar kind, using their own original ideas.

A COMPACT WOODWORK SHOP.

E. M. Wyatt, Director of Manual Training, Dallas, Texas.

Plenty of floor space is highly desirable in a woodwork shop. It would be pleasant to plan a shop for an educational air castle, but the author feels he will be safe in assuming that he will be helpful to many more readers if he undertakes to solve the more every-day problem of how to get as much as possible with a very limited floor space. This is the author's solution to this very frequent problem in his experience of what equipment can be installed in a standard classroom. Such a room is ordinarily about 22 feet by 32 feet. The problem and solution as presented assumes that there are no auxiliary rooms available for lumber, finishing, etc.

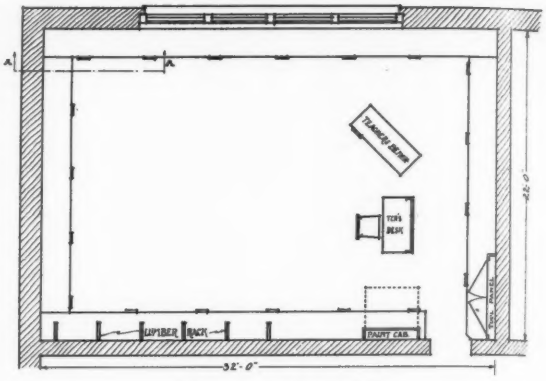
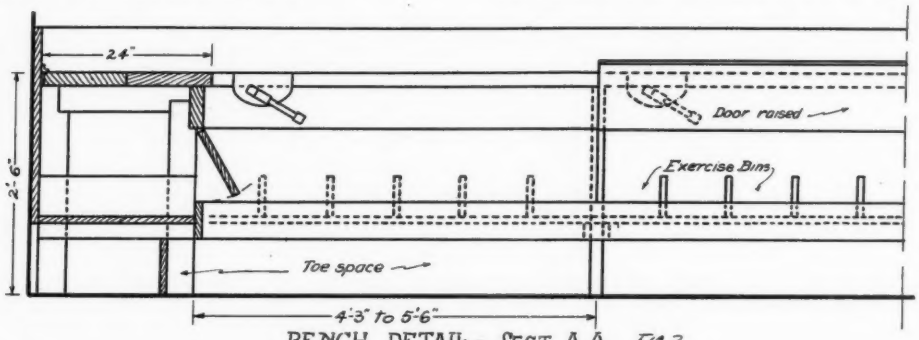


FIG. 1. PLAN OF SHOP.

Reference to the floor plan, Fig. 1, shows that the benches are built as a unit around the room with the exception of one single pupil bench which serves as the instructor's demonstration bench. With this bench a class of twenty students can be accommodated. This bench arrangement has the following advantages:

1. It is very economical of floor space, since there is no unusable space at the rear or ends of the individual benches.
2. It leaves a large central space for assembling, cutting stock, or for a machine or two.
3. The instructor has a view of the tops of all the benches unobstructed by tool racks.
4. The benches are heavy enough not to shake when in use.
5. It is especially suitable for a room with irregular shaped floor plans, as illustrated in Fig. 2. Plans B, C and D have the same over-all dimensions as A, but less floor space, yet have an equal or greater space for wall benches.
6. It is the most economical bench in cost. It can easily be built by pupils and teacher.

Teachers who have used this type of bench arrange-



BENCH DETAIL - SECT. AA Fig. 3

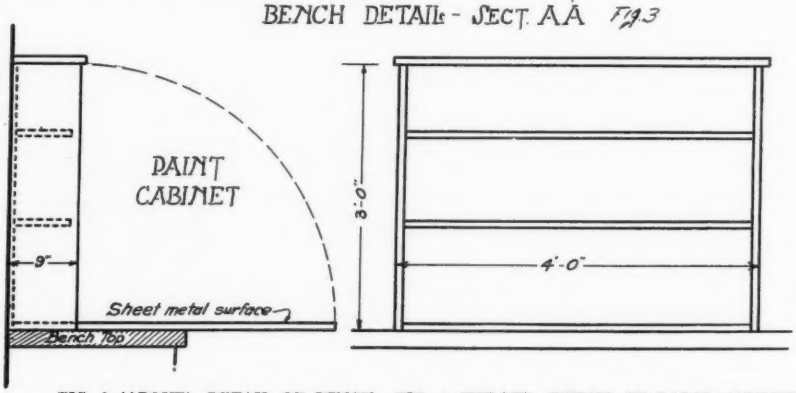


FIG. 3 (ABOVE). DETAIL OF BENCH. FIG. 4 (BELOW). DETAIL OF PAINT CABINET.

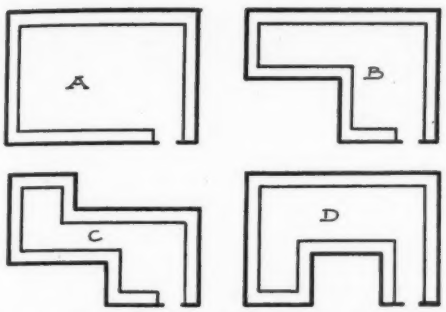


FIG. 2. LAYOUTS OF IRREGULARLY SHAPED ROOMS.

ment never want to change back to one where the room is full of benches and has no open space for work.

The detail drawing of the benches, Fig. 3, shows fully the bench construction which has been evolved out of repeated installations. It is easily and cheaply made and is entirely satisfactory. The tops are usually made of two 2½"x12" oak bridge planks, though sometimes varied by using a glued-up top of 1"x3" strips, and also by substituting a 1"x12" in place of the rear plank shown. When this last is used it is blocked up underneath to give a flush top.

The locker arrangement eliminates a lot of keys, gives each pupil an individual bin, and provides for stock too large for the individual bins being placed across the tops of the individual bins.

The instructor's bench is placed facing a corner that the pupils may be seated on the corner benches, three pupils per bench, during demonstrations.

Since the lumber must be kept in this room the lumber brackets are placed on the wall over the benches at the rear of the room. These benches are not assigned students in the smaller class groups.

The tool cabinet is placed over a bench never assigned regularly to a pupil. In larger classes where students rotate in acting as tool monitors, the one acting in this capacity always takes this bench. This permits him to work on his project when not busy distributing tools.

The paint cabinet is a messy item of equipment with most teachers. The one shown, Fig. 4, has the merit of concealing the almost inevitable unsightly smears from view and also providing a finishing bench. There will be no good excuse for stains and paints being on the work benches in this shop.

The author does not advocate concentrating a woodwork shop into a one classroom space from choice. However, it often has to be done and seldom as satisfactorily as in the several shops in which the above plans have been used. He offers it as a tried and entirely satisfactory solution.

Birdhouse Building Contests

The construction of birdhouses affords a type of problem that is always interesting and that has considerable merit from the standpoint of the best aims of manual training. The value of birdhouse building in developing originality and initiative, in giving boys a glimpse of community interests, and in affording the community a point of contact with the schools—all these advantages are too well understood to be discussed here.

The accompanying photographs are illustrative of different results of birdhouse building projects and of different methods of arousing school and community interests. They are suggestive as starting points for teachers who desire to work out their own methods of handling the local situation and of producing the best educational results.

A Christmas Sale.

The interesting group of birdhouses made at Lovington, Ill., during the winter of 1921-22 were shown in the high school gymnasium. The work was carried on in anticipation of a Christmas sale and the birdhouses were readily taken by local people. The work was handled acceptably by Mr. C. H. Dalton, head of the manual training department.

Building Birdhouses Without Expense.

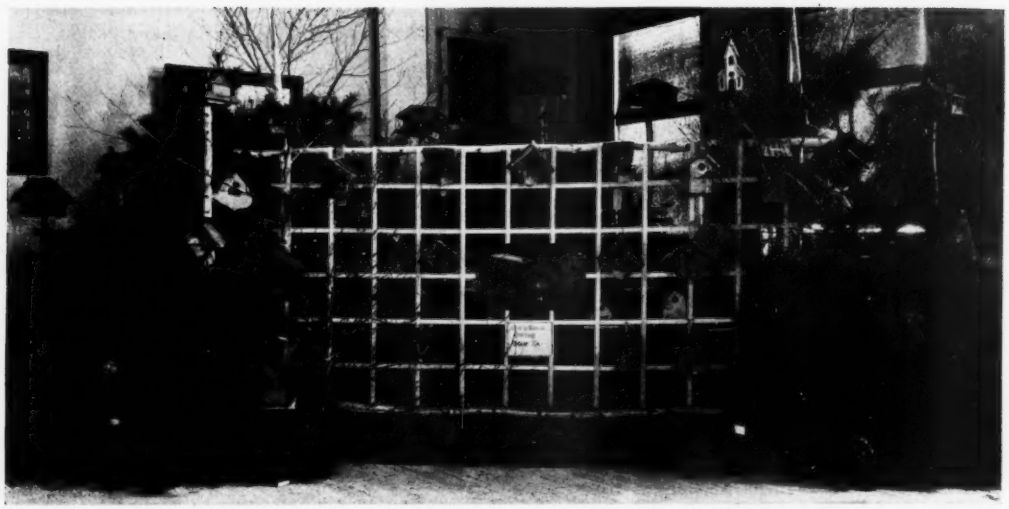
The interesting lot of birdhouses made by eighth grade boys at Clayton, Mo., under the direction of Mr. S. F. Hall, involved practically no expense for materials. The boys were asked to bring to class discarded packing boxes and crates. The call resulted in an ample supply of material. The birdhouses were in some cases covered with bark and in other cases painted a neutral color. The boys sold their productions at prices ranging from 50 to 75 cents. The project aroused considerable interest in the community in the care and protection of birds.

Profitable and Educational.

In addition to the primary aim of affording valuable projects, the making of birdhouses in the Lincoln School at Schenectady, N. Y., afforded a number of educational advantages. The birdhouses were made in the 7a grade under the direction of Mr. Richard Noyes, instructor of manual training, and were exhibited and sold in the school auditorium as shown in the picture.

The sale was the culmination not only of the manual training work, but also of a period of bird study undertaken in all the classes of the school. The drawing department and the English classes were interested to furn-

THIS DISPLAY IN THE GYMNASIUM OF THE TOWNSHIP HIGH SCHOOL, LOVINGTON, ILL., PRODUCED QUICK SALES.



A TOUCH OF THE FOREST MADE THIS DISPLAY AT SCHENECTADY, N. Y., AN OBJECT LESSON IN BIRD CARE.

THESE BIRDHOUSES WERE PHOTOGRAPHED ON THE W AY OUT TO "LOCATION." MR. D. C. AUSTIN MANAGED THEIR CONSTRUCTION IN THE ROCHELLE, ILL., SCHOOLS.

POSTERS MADE A COLORFUL BACKGROUND FOR THIS COLLECTION OF BIRDHOUSES MADE BY THE STUDENTS OF MR. GLEN BROWN, MUNCIE, IND.

VARIETY IN DESIGN, MATERIAL AND FINISH CHARACTERIZE THESE BIRDHOUSES MADE AT ROCK ISLAND, ILL., UNDER THE DIRECTION OF MR. A. W. JAMES.

ish posters for the exhibit and to prepare brief entertainments on birds and bird life. These entertainments took place on an afternoon and evening and a small admission fee was charged. Stories and recitations concerning birds and an address by a speaker from the state department of education at Albany were included in the program.

The entertainments and the sale of the birdhouses brought in over $60 toward the purchase of a new piano for the school. Three prizes were awarded for the best house by a committee composed of the head of the school department, a representative of the local woodworking industry and a nature lover.

The birdhouses were built of scrap wood brought in by members of the class and most of them were covered with bark collected by the boys. The exhibit, as will be noted in the picture, was embellished with pine boughs and small white birches. The collection of this material required a number of hikes into the country and resulted in the formation of an outdoor club.

A Prize Award.

The photograph of birdhouses made by the boys at Rochelle, Ill., illustrates the culmination of a birdhouse building contest conducted by Mr. D. C. Austin, head of the manual training department. The contest was arranged by the local business men and cash awards were given to the boys who built the best houses.

Exhibit in Store Window.

The birdhouses built in the spring of 1922 by the boys of the first year carpentry class of the Hudson, N. Y., high school, were exhibited for a week in a prominent store window. The display aroused considerable interest.

As a feature of the birdhouse construction project, each member of the class was required to make a study of the bird for which he was planning to build a house and to submit a short composition on the life and habits of the bird, the best location of the house, and the value of the bird to the community. The work was carried on under the direction of Mr. Kenneth R. La Voy and prizes were provided by a member of the Hudson board of education.

A City and County Contest.

A wide community interest was aroused in the birdhouse contest and exhibit held in March 1922 by the manual arts department of the schools of Muncie City and of Delaware County, Indiana. The contest was arranged by Mr. Glen D. Brown and Mr. Wm. Rutledge and was conducted under the auspices of the local humane society.

Under the rules of the contest all contestants registered with their instructors on a certain date. The lists of entrants were sent to Glen D. Brown, director of manual arts, Muncie city schools, who also served as chairman of the committee, made arrangements for the judges and planned the method of judging.

After three weeks were spent in the construction work by pupils of the various schools, the judging took place within the eighteen school buildings. Individual prizes, $1.25 first prize and 75 cents second prize, were awarded to the winning boys and girls in each of the sixth to eighth grades inclusive in each building. All entries were graded and those who made 80 per cent were eligible to enter the central exhibit held the following week

A PROMINENT MERCHANT AT HUDSON, N. Y., WAS PROUD TO SHOW THESE BIRDHOUSES AT A SACRIFICE OF VALUABLE DISPLAY SPACE.

MADE BY THE STUDENTS OF MR. S. F. HALL, CLAYTON, MO.

at the Chamber of Commerce in the city of Muncie. One grand prize of $5 and a second prize of $2.50 were awarded to the winners in each whole year grade, irrespective of building. There were over six hundred birdhouses in the final exhibit, a part of which is shown in the accompanying picture. The posters on the wall, pleading for kindness to birds and animals, were made by pupils of the various schools. Awards were also made for this work.

The rules of the contest provided that one individual was allowed to enter as many as three houses. Birdhouses, feeders, shelters and sparrow traps were considered as legitimate entries. Contestants were not limited to any special material but were to have made the project during the school year and were to have made them in the shops at school. Mr. O. E. Sink, professor of industrial arts and O. B. Christy, professor of national science, Eastern Division of Indiana State Normal, were the judges. They judged the entries on the following basis: Artistic Merit, 30%; Workmanship, 30%; Adaptability, or fitness to purpose 40%.

The announcements of the contest and exhibit printed in the high school printery, included the rules, announcement of prizes, list of competing schools, suggestions for good results and a bibliography of books and references to aid in the making of the projects.

Interesting Local Clubs.

The birdhouse exhibit at Rock Island, Ill., held two years ago under the direction of Mr. A. Ward James, aroused the attention of local clubs and organizations. A local business man provided five prizes for the best birdhouses and additional prizes were given for martin houses, for bluebird houses and for wren houses. About 200 birdhouses were built and the judges had a difficult time to pick the winners in each group. The exhibit and sale aroused considerable local interest and resulted in newspaper publicity for the manual training department.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

A BUNGALOW.

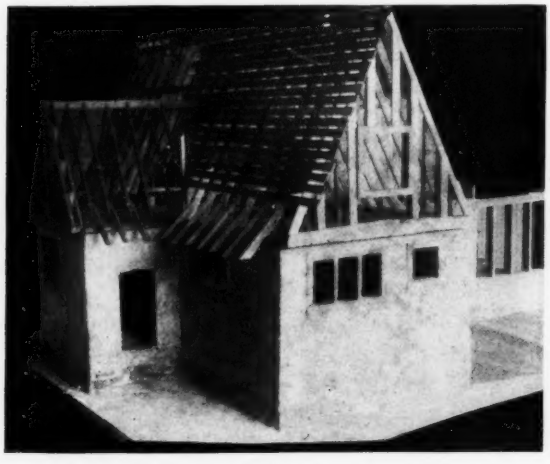
A. F. Bick, Milwaukee, Wis.

The building of a bungalow in miniature will furnish an excellent subject to encourage high ideals and familiarize the boys in the various trades. It allows a wide range of teaching matter which can easily be brought home to the students. To illustrate, if your aim is vocational guidance and you wish to familiarize the boy with industries, you would have the opportunity of explaining, not merely the building trades, but the related and dependent industries. Enough should be said of the cement industry, when pouring the foundation, and the steel industry, when using reenforcement and laying the beams, to give the boy a more or less clear idea of their characteristics.

The building, of course, must be more than a box, even if it is small. First, there should be plans and blueprints, and a word about styles of architecture; then the moulds for the concrete should be built, and the best mixtures for different kinds of work should be discussed. The concrete is then poured and allowed to harden.

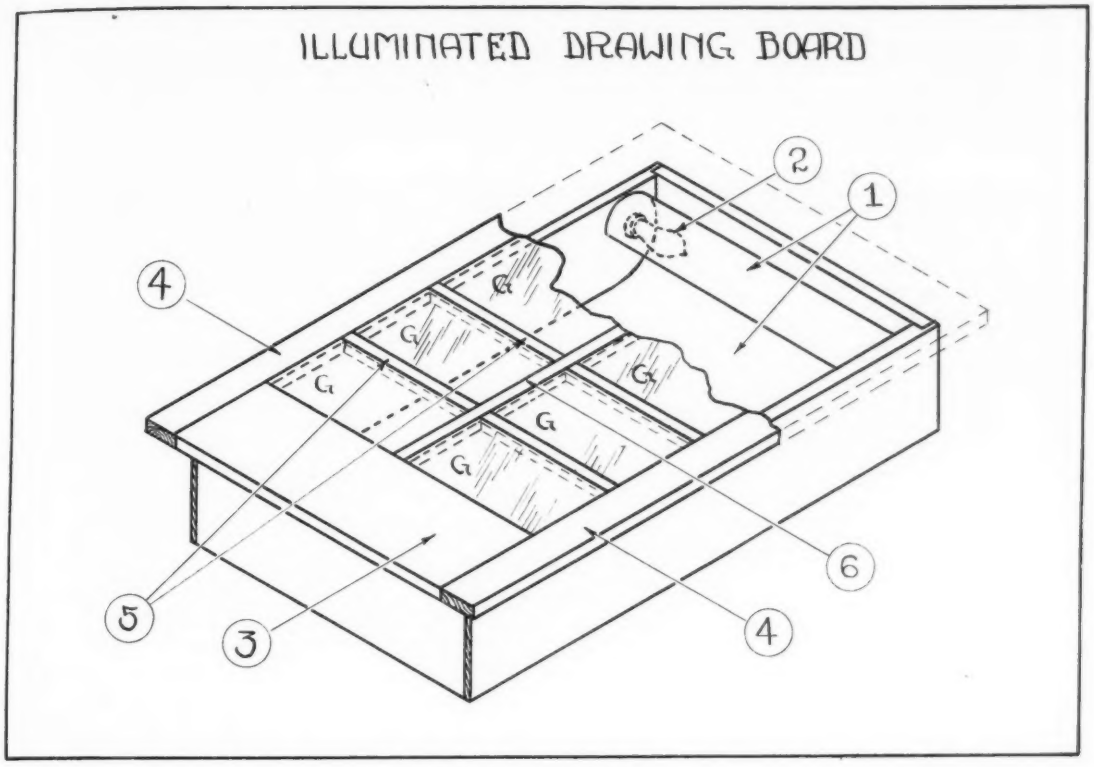
The bungalow in the illustration stands 40 inches high and is 54 inches wide and 72 inches long. It has a concrete foundation and is built to scale, the lumber for the joists, studs, rafters, and the rest, being sawed to size by machine. Otherwise, everything was hand-made by boys in the fifth to the eighth grades, even to the making of miniature shingles.

The outside is stucco and the inside plaster applied on wire lath, or screen in this case. The windows are



THE BUNGALOW UNDER CONSTRUCTION.

THE COMPLETE BUNGALOW.



DETAILS OF DRAWING BOARD.

glazed and open like casement windows. The fireplace, chimneys, and outer court are built of small stone and mortar, the court having an artificial pool in the center. The bathroom is of white tile. The dining room has a raised wooden floor, while the living room floor is of red tile. The latter room takes up the entire left wing from floor to roof, with beam ceiling, and staircase and balcony leading to the rooms on the second floor.

The path from the kitchen door leads out between two garden seats and a pergola.

Volunteers from each grade did the work and these were divided into groups who had charge of the various operations. For example, a group was responsible for the concrete moulds, another for window sash, another for window frames, and so on through.

The work required a full semester, with an average of forty boys giving an hour and a half each week.

AN ILLUMINATED DRAWING "BOARD."

Margaret Fullerton, Oklahoma College for Women, Chickasha, Oklahoma.

The drawing "board" shown fills a long felt need for an artificially alluminated surface to which parchment lamp shades and other similar problems, can be tacked while the painting is being done.

The device illustrated consists of a box having a top with glass panes set flush with the upper edges of its wooden members, (3, 4, 5, and 6); a sheet of bright tin for a reflector; and electric bulbs so arranged that their light is reflected onto the bottom of the box, and hence up through the glass top.

The top of the box should be made of pine, or other soft wood, to facilitate the use of the thumb tacks in fastening the parchment to it. The rest of the piece may be built of any sort of lumber available. Where space permits, legs may be added, thus converting the simple box into a table.

Names of Parts.

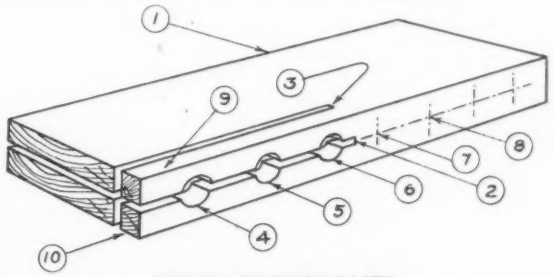
1. Tin reflector.
2. Electric bulbs.
3. 4. 5. 6. Frame of top to which shades are tacked.
7. Panes of double strength window glass.

A RAPID METHOD OF MAKING SHELF RACKS.

Charles W. Frost, St. Paul, Minn.

The accompanying sketch illustrates a method of making shelf racks that is rather more accurate, and decidedly faster, than that usually employed.

A piece of clear, dry No. 1 lumber is required, an inch and a half in thickness; as long as the racks; and as many times three quarters of an inch wide as there are to be pairs of racks. This width is given for use with a circular saw, cutting a quarter inch kerf; wider or narrower should be allowed for accordingly.

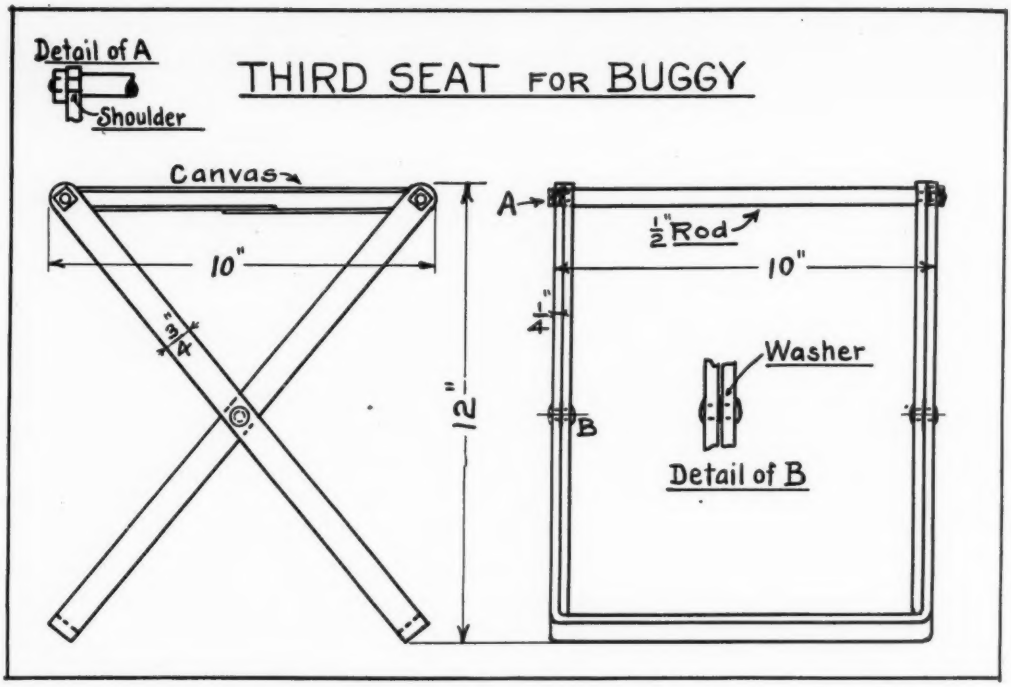


DETAILS OF SHELF RACKS.

A gage line is drawn along both edges of this plank, equidistant between its sides.

Upon this line are next laid out, the proper distances apart, knife lines 7, 8, etc.

With the intersections of the gage and knife lines as centers, bore holes 4, 5, 6, etc.. thru the plank from *edge to edge*. This can, of course, be done much more easily where a power boring machine is available, but a careful workman should have little difficulty if obliged to use an auger bit and brace.



The plank is now sawed in two edgeways, care being taken to set the ripping fence so the saw kerf, No. 2, is centered upon the gage line.

It is finally ripped into strips, 9, 10, etc., which need only be planed and sanded to be ready to nail or screw into place in the article for which intended.

The result will be identical if saw cut No. 3 is made *before* No. 2, instead of *after* as described above.

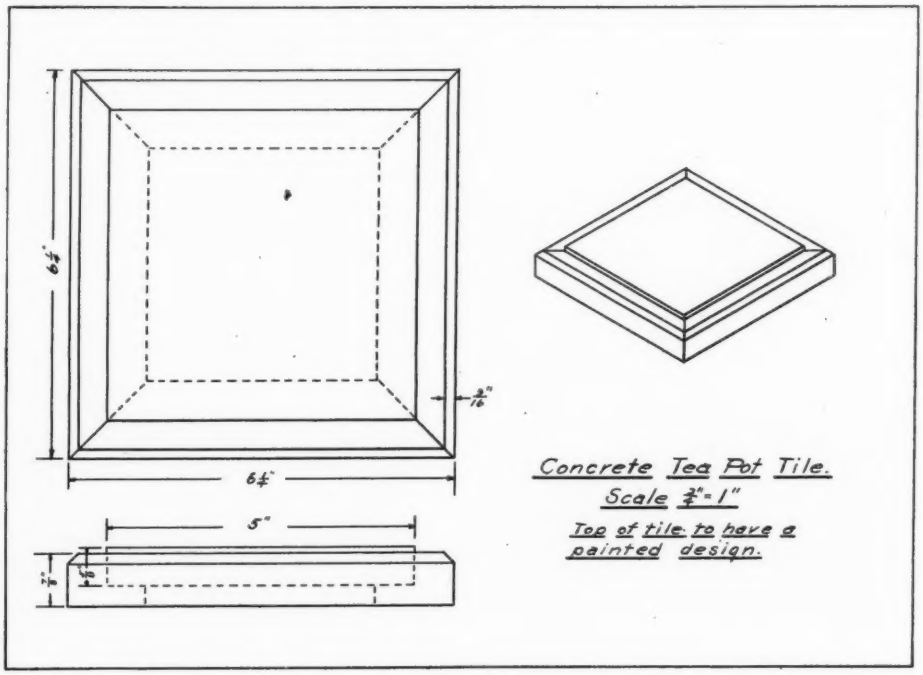
This type of shelf rack is so universally known that it is unneccessary to describe or illustrate its use here.

THIRD SEAT FOR BUGGY OR CAMP STOOL.
Eber L. Moore, Connersville, Ind.

The camp stool is a very simple but practical problem. The bending is done cold. It is made of two pieces of strap iron ¼"x¾"x44", each bended U shaped to form the two parts on which the stool is to rest. These parts are hinged by means of rivets, with washer between the two parts. Two rods 10 inches in length, threaded at either end, connect the upper parts of the seat. Canvas stretched between these rods, forms the seat of the stool.

CONCRETE TEAPOT TILE AND FRAME.
Kenneth L. McCulloch, Plainfield, N. J.

This is a very simple model to use in beginning concrete work. It has been satisfactorily used in teaching the making of miter joints.



The mould is made of small pieces of wood which always collect and for which it is sometimes hard to find a use. If given one or two coats of paint and well cleaned each time it can be used many times.

Several schemes are employed in decorating the tile. The surface is sometimes painted and a suitable design afterward applied with a quick drying enamel; or the entire mass may be colored by adding prepared coloring materials before placing in water. A more elaborate decorative scheme may be carried out with the use of a coloring method which has recently been placed on the market.

The proportion should be one part sand to one part cement with a small square of wire screen for reinforcing.

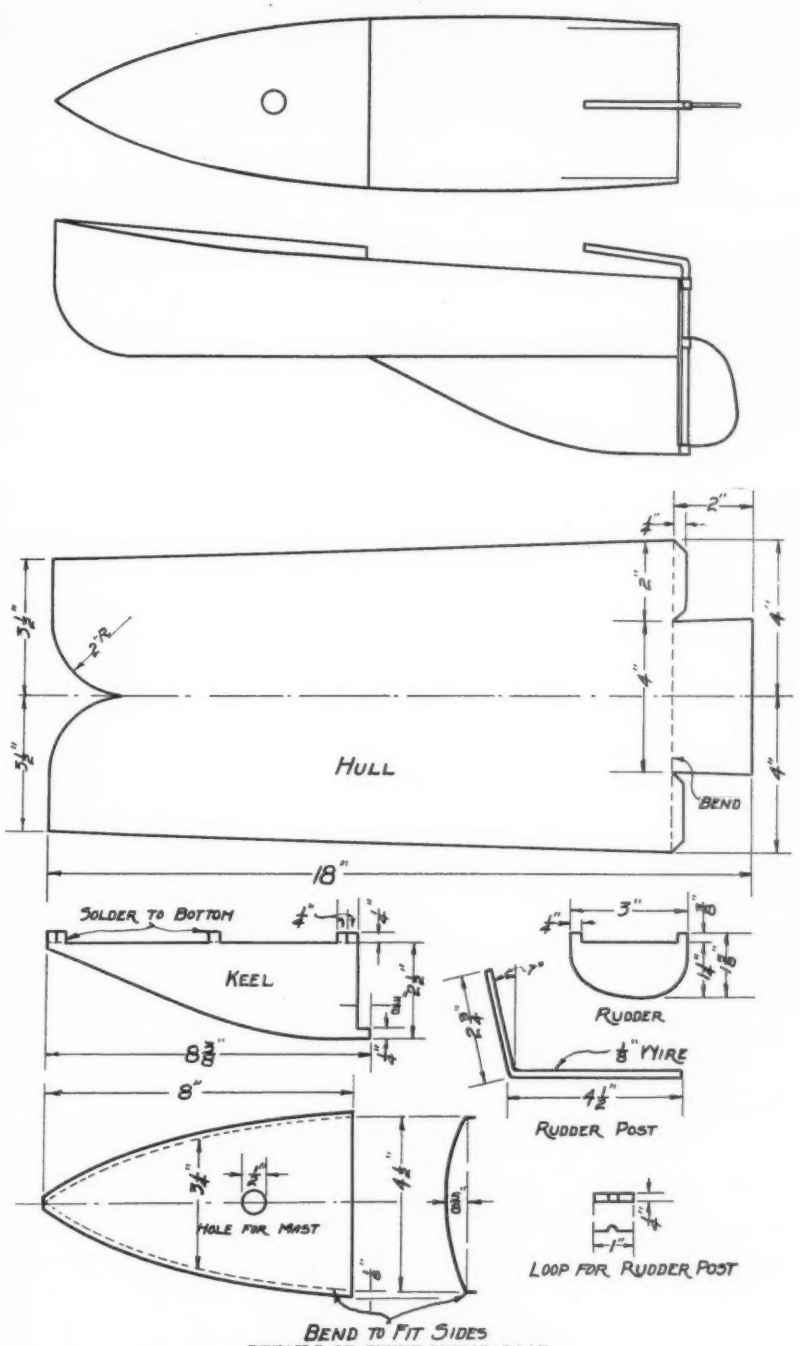
A SHEET METAL BOAT.

N. E. Morris, Santa Fe, N. Mex.

In looking for a project that will give interest and at the same time give the younger student an opportunity to learn a few points of laying out and soldering, the writer found a boat of tin to be especially valuable.

The simplicity of the layout and the fact that no added equipment beyond snips and a soldering outfit—which should be in every shop anyway—make this an especially suitable project for the school that has not yet added sheet metal equipment.

The hull is folded at right angles along the dotted lines and the sides folded up with the flaps on the outside, and the sides taking a natural rounded bend as they come to a point at the front. These joints should be soldered leakproof. The top may be next soldered in place well up to the front, the edges bent to fit the curve of the sides. If used as a sail boat, a half-inch hold should be cut for a mast and wire loops soldered in place for a bow-sprit and stays. Flaps are left on the keel to be bent at right angles and soldered to the bottom while the three-eighths flap is to be bent to give a loose bearing for the bottom end of the rudder post.



DETAILS OF SHEET METAL BOAT.

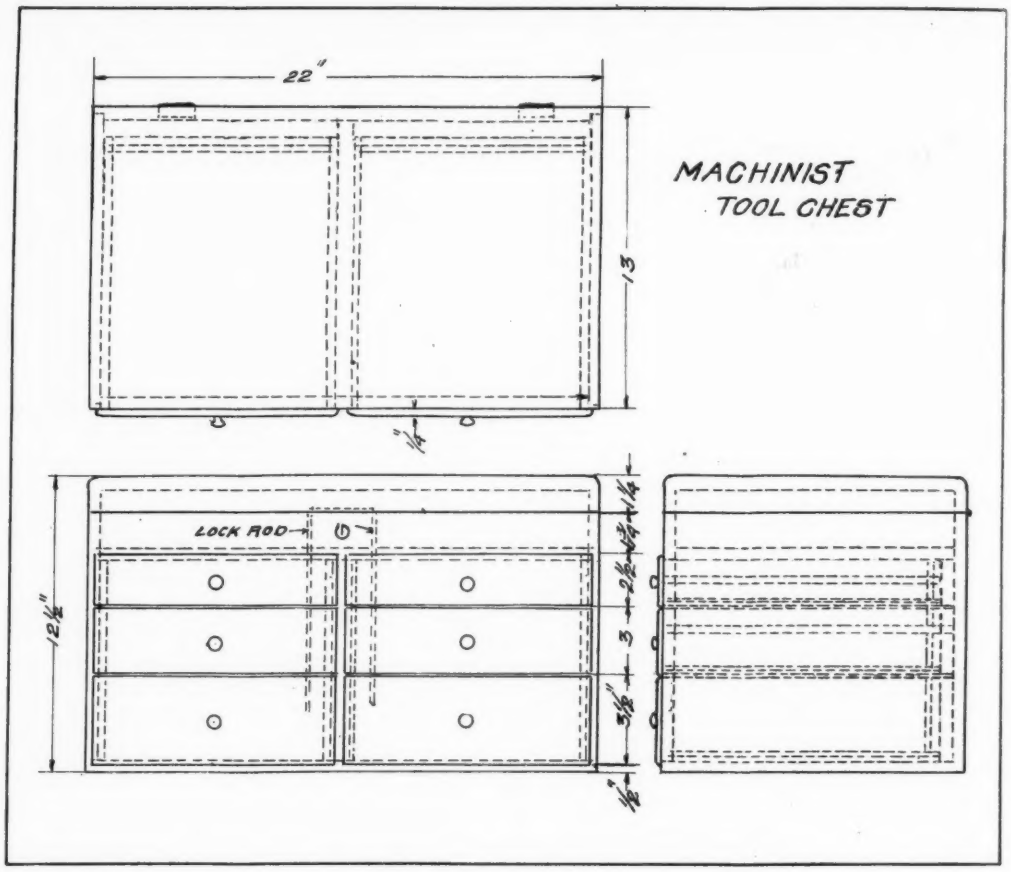
The rudder is made by soldering the flaps around the wire post and is held in place by the loop soldered to the edge of the hull.

MACHINIST'S TOOL CHEST.

G. H. Wichmann, Coleraine, Minn.

It is a common practice in industrial courses of most schools for the school to furnish all tools, be custodian for the same and to keep them in proper condition. To the writer this has seemed a poor policy especially for students in the advanced mechanical courses. Tools possess a strong individuality and the master workman has little use for a tool not his own. Again, the student loses considerable time checking tools from the stock room and in many cases draws a poor tool or one that another student has abused. The collecting of a set of tools should be especially encouraged for students following mechanical, automobile, electrical, and tinsmithing trades. Such a collection of tools demands a proper case in which to keep them.

The chests shown in the drawing were designed to meet this need. They represent a good woodworking project of sufficient difficulty for the advanced woodworking student. The project may be varied from the easy to more difficult construction and calls for a variety of hand



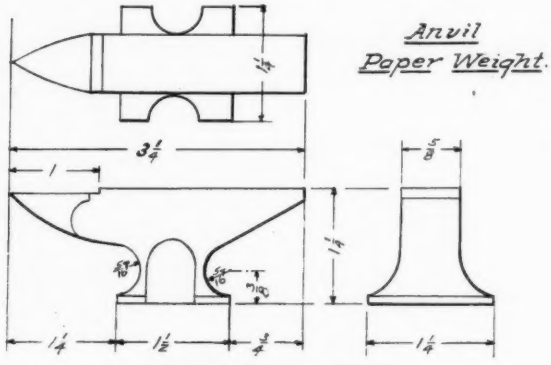
DETAILS OF A MACHINIST'S TOOL CHEST.

and machine operations. Sizes and dimensions may be varied to suit the needs of individual cases. All the drawers may be locked by boring a ¼" vertical hole as shown in the drawing and inserting lock rods. This arrangement necessitates but one lock for the entire chest.

ANVIL PAPER WEIGHT.

Grover C. Polson and W. W. Updegraff, Oakland, Calif.

This paper weight is made from 1¼ inch machinery steel. First two ⅝ inch holes are drilled to correspond with the 5/16 inch radius on the drawing. Each hole is drilled ¾ inch and 1¼ inch respectively from the ends. The sides are then cut down as far as the center of the drilled holes, leaving the face of the anvil ⅝ inch wide. Next each end is cut with a hack saw ⅛ inch from the face, tangent with the ⅝ inch hole on the ¾ inch end, and ¼ inch from the face to the center of ⅝ inch hole on the 1¼ inch end. Then saw through the center of the drilled holes on the bottom. Now with a 12 inch round file, the fillets are formed, as shown in the drawing. This roughs out the piece. It is then finished all over as shown in the sketch.



DETAILS OF PAPER WEIGHT.

Build Own School. The boys of the Peckham Vocational School, at Buffalo, N. Y., are gaining practical experience as well as theoretical knowledge in the erection of their own school. The city council has appropriated $10,000 for the materials with which to build the school, the boys of the wood working classes to do the work. The carpentry class is doing the actual building while the classes in millwork and cabinet making will make the door frames, window frames, doors, sashes and all similar work. The iron work will also be done by the pupils of the machine shop class. The interior and exterior decorating will be done by the classes in wood finishing and painting.

The building when completed will be worth $25,000. This means that the boys of the school are saving the city about $15,000. The original plans and specifications were worked out by the drafting instructor and the drawings and blue prints were made by the pupils of the drafting classes. The several classes in related subjects worked out the problems pertaining to the building. The opportunity has been given for acquiring a great deal of practical information in the actual work and for gaining an understanding of the underlying principles of the trade.

Unit Courses. The schools of Erie, Pa., are offering two-year unit trade courses in automobile mechanics, cabinet making, commercial art, drafting, electricity, machine shop work, pattern making, printing, sheet metal work and tailoring.

MISSISSIPPI VALLEY CONFERENCE.

The Thirteenth Annual Conference of men representing institutions engaged in the preparation of teachers of manual arts and industrial education in the Mississippi Valley States was held at the University of Wisconsin, Madison, Wisconsin, on Thursday, Friday and Saturday, January 11th, 12th and 13th. This meeting is held annually at the call of the Commissioner of Education under the immediate direction of Dr. W. T. Bawden, Assistant to the Commissioner. The meeting was well attended this year, and many interesting and profitable discussions were carried through. The conference is an intensive one, sessions being held morning, afternoon and evening. The attendance, classified by states, was as follows:

Alabama. R. W. Sharp, North Alabama State Normal, Florence.

D. of C. W. T. Bawden, U. S. Bureau of Education, Washington.

Illinois. A. B. Mays, University of Illinois, Urbana; Wayne Wetzel, State Teachers College, Macomb; C. A. Bennett, Industrial Education Magazine, Peoria; A. C. Newell, State Normal University, Normal; E. T. Filbey, University of Chicago, Chicago; James McKinney, American School of Correspondence, Chicago; A. F. Siepert, Bradley Polytechnic Institute, Peoria; L. M. Cole, Millikin University, Decatur; E. C. Phillips, University of Illinois, Urbana.

Indiana. O. H. Day, Indiana University, Indianapolis; O. E. Sink, State Normal, Muncie; F. M. Treat, Indiana University, Bloomington.

Iowa. C. H. Bailey, State Teachers' College, Cedar Falls.

Michigan. Thomas Diamond, University of Michigan, Ann Arbor; M. J. Sherwood, State Normal School, Kalamazoo.

Minnesota. D. M. Schweickard, State Department of Education, St. Paul; H. J. Smith, University of Minnesota, Minneapolis.

Missouri. R. W. Selvidge, University of Missouri, Columbia.

Ohio. F. C. Whitcomb, Miami University, Oxford; W. E. Roberts, Public Schools, Cleveland; E. L. Usry, Ohio State University, Columbus; C. S. Van Deusen, State Normal College, Kent.

Texas. J. G. Grove, East Texas State Normal, Commerce.

Wisconsin. I. S. Griffith, University of Wisconsin, Madison; C. A. Bowman, Stout Institute, Menomonie; H. W. Schmidt, State Department of Education, Madison; G. B. Cox, University of Wisconsin, Madison.

The topics discussed at the meeting were as follows:

A study of curricula for the preparation of teachers of manual arts and industrial subjects.

The manual arts in the junior high school.

Standards of eighth grade attainment in shopwork; what in the way of manipulative processes and information about them should a boy who has completed the eighth grade know.

Progress in the development of plans for the training of teachers.

Preliminary report of the committee on problems involved in the preparation of teachers for the general industrial school.

Objective tests and measurements as applied to manual arts and industrial subjects.

Problems in the organization and administration of the general industrial school in smaller cities.

Each topic was handled by one or more members to whom it was specifically assigned, with focussed discussion following.

It was decided that subject to the call of the Commissioner, the meeting will be held next year at the University of Illinois. Some of the questions which were proposed and which were referred to committees for definite report at the next meeting, were as follows:

1. Tests applicable to the field of manual arts. Selection and proposed use of such tests.

2. Methods and materials for practical arts instruction in junior and senior high schools.

3. What content and characteristics for courses necessary to train teachers for positions in present industrial educational work.

The meeting is a unique one in that it is attended by people engaged in the same work with the same interests.

—C. A. Bowman.

THE BOSTON VOCATIONAL SOCIETY MEETS.

A large attendance of members and friends of the Vocational Education Society of Boston at the monthly meeting January 13 pointed to a particular interest in both the speaker for the day and his subject. Mr. Hector L. Belisle, Superintendent of Schools in Fall River addressed the Society on the subject "Manual Arts in Junior High Schools."

The Junior High School is a comparatively new development in Fall River and Mr. Belisle's remarks were alive and apt as he reviewed the considerations which convinced the committee of the need for, and later controlled the planning for the Manual Arts Courses in the new Junior High Schools of Fall River.

Mr. William E. O'Connor of the Frank V. Thompson School at Boston has been appointed Secretary of the Society. Mr. Morris J. Moriarty, the former Secretary has been compelled by ill health to lessen the number of his activities and it was with sincere regret that the executive board accepted his resignation from this office which he has administered so acceptably.

Seven new members were voted upon and accepted at this meeting, an indication that the meetings of the society and the aims and purposes of the society itself are attractive to men teaching in Manual Arts and Industrial courses throughout the state.

The Society has made the first subscription, the sum of fifty dollars, toward a fund to provide a suitable memorial to the late Frank V. Thompson, a Superintendent of Schools in Boston and a man who has been eulogized as a stanch and ardent friend of Vocational Education when such education was not as popular as it is now.—**J. I. Lusk.**

LARGE ATTENDANCE AT SCHOOL CRAFTS CLUB.

The January meeting of the School Crafts Club of New York City was a great success, both in regard to a large attendance in spite of a stormy night, and because of the par-excellence of the program of speakers furnished. This meeting, held on Saturday evening, January 20, in the grill room of the Lyons Restaurant, was under the leadership of Mr. A. W. Garritt and Mr. L. J. Young, Directors of Shopwork in the New York City Schools. Throughout the program, with only one exception, the presentation rather than the projects themselves, was stressed. Mr. Garritt, in his introductory remarks, illustrated this difference by referring to the foods we eat. No matter how many books of recipes are available, the results of a cook's work are very poor unless she knows how to go about the process intelligently. Both the technique and the project must go hand in hand.

"How Shall We Get the Aim of our Shopwork Over to our Pupils?" This subject was discussed by Mr. John Kuhn, of Public School No. 126, Brooklyn. If boys are asked the aim of shopwork, the replies are of this order: to teach a trade. Lack of time allowed per pupil makes this an impossibility. The real reasons include (1) Because it is the natural thing for a boy to manipulate tools, man is a builder. (2) General educational aims. (3) Training in usefulness at home. (4) Coordinating development of mind and body. Sturdiness and development of intellect go hand in hand for success. Thought should come before action. (5) Accuracy. (6) Order of procedure.

The subject of "Forests and their Value" was handled by a man who knows the woods from boyhood days, Mr. J. A. McKay, Public School No. 95, Queens. Observation Mr. McKay said, is the basis for all teaching. We must use this principle in teaching by having illustrative material at hand. Appreciation of the forest deters destruction of wood on the part of pupils. Mr. McKay demonstrated a lesson plan in which he led up from a simple growing plant in a box, via the trees in the park, to a realization of what a forest is and looks like. He emphasized that we should teach the characteristics of broad and needle-leaf trees, structure of trees, etc. He displayed some splendid charts on these subjects.

"Shopwork Illustrative of Organized Thinking," was discussed by Mr. A. L. Markwood, Public School No. 46, Manhattan. This teacher believes in teaching the pupils big ideas first about a job on hand, and then in future lessons to divide and subdivide each topic in a systematic and orderly way.

When should charts be used in the shop? They should only be used at the time needed to illustrate the aim of the teacher, and not hung up and left during the entire lecture. This subject of charts was demonstrated by Mr. E. Montaque, Public School No. 110, Brooklyn. The charts exhibited were beautifully rendered and covered all phases of shop teaching.

The last speaker, Mr. Chas. Muller, New York City, exhibited many models of gliders propelled by such means as the sling shot, arm throwing and stretched rubber cord. Balsam wood was used in wing construction and spruce for the framework of the fusilage. His gliders do all sorts of aeronautical stunts such as the Immerman Turn, looping the loop and banking.—Lloyd F. Stair..

OREGON VOCATIONAL CONVENTION.

The Vocational Education Department of the Oregon State Teachers Association met in regular session December 28, 1922. This department includes the divisions of agriculture, home economics, industrial arts, and commercial education.

Mr. E. D. Doxsee of the School of Agricultural Education, gave a talk on "How Vocational Education is Utilizing the Best Principles of Teaching". Miss Louise Wood, State Supervisor of Vocational Home Economics spoke on "Home Economics Education in Oregon", and Mr. C. W. Comstock, a manual training teacher in Portland, spoke on "Industrial Arts." We were very fortunate to have Mr. E. W Barnhart, chief, Commerce Education Service, Washington, D. C., who gave a splendid talk on Vocational Education. Mr. Barnhart's talk was very well received and created a great deal of enthusiasm for vocational education.

A. R. NICHOLS,
Corvallis, Ore.

Mr. A. R. Nichols, State Supervisor of Trade and Industrial Education, Corvallis, Oregon, was elected chairman and Miss Louise Wood, State Supervisor of Vocational Home Economics, was elected secretary. In the agricultural division Mr. Forest Rycraft of Lebanon, Oregon was elected president, and Mr. K. D. Fendall of Newberg, secretary. Industrial Arts section: Mr. A. K. Trenholm, President; Percy Dawe, Estacada, secretary. Home Economics Division: Miss Ruth Kennedy, Corvallis, president; Marion Hodgson, Corvallis, secretary. Commercial Education; R. D. Taylor, Portland, Oregon, president; Mrs. Bertha McCormick, Coquille, Oregon, secretary.

ILLINOIS MANUAL ARTS MEETING.

The nineteenth annual meeting of the Illinois Manual Arts Association was held December 27th, in the Springfield High School, Springfield, Ill. The meeting was well attended and an excellent program was given both morning and afternoon. Mr. L. M. Cole presided at the meeting.

The first address "Sidelights on Machine Drafting" was ably handled by Mr. M. E. Wharry of the Bradley Polytechnic Institute, Peoria, Ill. Mr. Wharry emphasized the essential things to be taught in drafting.

A. B. McCALL,
President, Illinois Manual Arts Association.

A talk on "How to Get Good Design in Shop Courses" was covered in an interesting manner by Mr. E. J. Lake, of the University of Illinois. Mr. Lake Supplemented his lecture with blackboard sketches showing the application of fitting design.

"The Enrichment of the Manual Arts Course," by Prof. Arthur J. Mays, of the University of Illinois, was the most vital of the topics on the program and proved decidedly interesting. Mr. Mays emphasized the fact that more than mere training in tool manipulation must be given in order to justify the manual arts to a place in the school curriculum. He commented on the course in shopwork adopted a few months ago at the high school conference at Urbana, which allots thirty to fifty per cent of the shop time to discussions and reference work.

Mr. L. C. Petersen of the Southern Illinois Normal, presented the subject "Toy Aims in Education." He brought forth some new ideas concerning the aims of toy making and gave demonstrations of a number of working models in toys.

The last address on the program, "Course of Study in Automobile Mechanics" was presented by Mr. C. M. Hewitt of the Bradly Polytechnic Institute, Peoria. In addition to valuable suggestions regarding the organization of a course in automobile mechanics, Mr. Hewitt presented some facts regarding the automobile industry in modern life.

The Business Session.

The members, after some discussion, voted to leave the selection of a meeting place for the 1923 meeting to the executive committee. The sentiment was strongly in favor of having a different city each year for the annual meeting place. The matter of affiliation with the High School Conference Section was discussed and action deferred.

The following officers were elected for the next year: President, Mr. A. B. McCall, Springfield, Ill.; Vice-President, Mr. M. F. Kavanaugh, Springfield; Secretary-Treasurer, Mr. Linder S. Wood, Bloomington, Ill.

VOCATIONAL TEACHERS' COUNCIL.
M. F. Kavanaugh.

The New York Vocational Teachers' Council, comprising the vocational teachers of Greater New York, held its annual meeting the early part of January, at the Washington Irving High School.

The association appointed a committe on luncheons and dances. Delegates to the union educational council were also appointed.

At the business meeting, Mr. John A. Frenzel was elected president; Miss Frances Martinez, vice-president; Mr. C. Peter Peterson, recording and corresponding secretary; Mr. John M. Lamb, financial secretary; Mr. Dazine Blumberger, treasurer.

NEW JERSEY CONTINUATION SCHOOL CONFERENCE.

The directors and teachers of continuation school classes of Warren, Mercer, Burlington and Camden Counties (New Jersey) held an interesting conference on December 9th, at the Trenton Continuation School, Trenton, N. J. The program was prepared by Mr. E. A. Reuther, Assistant Director of Continuation School Work, and was presented under the chairmanship of Mr. Wesley O'Leary, Assistant Commissioner of Education of New Jersey.

Mr. William J. Bickett, Superintendent of Schools of Trenton, who welcomed the teachers, gave it as his belief that the continuation school teachers were doing a fine piece of work. They are giving of themselves to their pupils and it is this personal contact which is so necessary and which is dependent on the personality of the instructor. Mr. Bickett affirmed his belief in the continuation school because it is the beginning of part-time education, and the result will undoubtedly promote a desire for more education on the part of the employed minors. He pointed out that the continuation school has a direct connection with the evening school and described a plan under consideration at Trenton. It is proposed to organize the continuation school and evening schools in such a way that a teacher may be engaged for two hours in the former and two hours in the latter, with another two hours of service in the shops and factories where the students work. This plan gives part-time pupils the benefit of teachers who are not physically tired and who are in position to benefit from the information gained through direct contact with the industrial problems and needs of the students.

Mr. Wm. R. Ward, Supervisor of Continuation Schools of Trenton, outlined briefly the procedure in issuing working papers and enrolling pupils in the continuation school. He presented samples of the various blanks used and commented on the earnestness with which the teachers had attacked the school problems, and the manner in which they had supported the work.

Miss Margaret Root, Assistant in the Continuation School at Camden, presented several typical lessons for part-time pupils. Miss Root emphasized the need for definite plans, activity in gathering suitable teaching material, definite aims, socialized recitations and adequate followup of the results of the lessons.

Mr. Paul S. Lomax, Director of Commercial Education, Trenton, outlined a suggestive course of commercial work for part-time classes. He suggested a gradual elimination of the traditional courses of typewriting, stenography and bookkeeping and the outlining of courses based on the junior business occupations. Mr. Lomax commended Miss Root's suggestions on using the problem method of approaching topics. He declared the point of departure in all lesson planning should be the job activities of the pupils and that real and vital problems should be found in both commercial and industrial plants. He traced the four steps involved in problem solution, namely statement, inspection, inference and verification, and then gave typical examples of each.

Mr. J. J. Berilla gave an interesting talk on the relation of the instructor to the pupil, the parent and the employer. He used the case method in driving home his points and proved the valuable work being accomplished in the continuation school. He mentioned typical examples where children through the efforts of the school had been started on a definite program by sympathetic treatment and counsel.

Miss Alice Knight of Trenton, displayed a wealth of teaching material which she had gathered and classified. She commented on the value of the training course given at the State University during the summer and the spirit of cooperation which had been manifest. The exhibited material was well mounted on folders, properly labeled for filing and were such as to convince anyone of the value of the work accomplished in the continuation school. In the folders were gathered data from postoffice, bank, telegraph office, express office, and department store, all of which afford excellent practice in English, elementary business practice and the everyday business of real life.

PENNSYLVANIA SOCIETY FOR VOCATIONAL EDUCATION.

The third annual meeting and luncheon of the Pennsylvania Society for Vocational Education was held on December 29th, at the Hotel Bethlehem, Bethlehem, Pa. The attendance reached a total of 194 persons.

President James C. Tucker thanked the Bethlehem Steel Company for its support of the industrial program of the schools and expressed to the officials present, the society's appreciation of their arrangements, making possible a trip through the company's plant. Mr. Tucker commented on the gratifying increase in the membership of the society, the enrollment having increased from 155 in 1921 to 256 in 1922.

Mr. L. H. Dennis, State Director of Vocational Education, commented on the rapid growth of the society and upon the tremendous development in vocational education in the state during the past five years. He commended industrial leaders for their interest in the movement as manifested by their attendance with schoolmen at a luncheon of a vocational society.

Mr. J. N. Muir, superintendent of schools of Bethlehem, who acted as toastmaster, praised the men of affairs in Bethlehem, who had placed themselves behind the building program of the schools, and had given encouragement to the local board. He commended the Bethlehem Steel Company for its agreement to take all the industrial graduates of the high schools under favorable conditions as to wages and instruction.

Mr. J. M. Larkin read an address by Mr. E. G. Grace, President of the Bethlehem Steel Company, in which the writer expressed great interest in the development of vocational education and commended the Bethlehem program.

Following the luncheon, the society proceeded to the business of the meeting. The officers elected are as follows:

President, Willis R. Skillman, Carlisle, Pa.; Vice-President, James C. Tucker, Bethlehem, Pa.; Secretary-Treasurer, H. E. Todd.

INDUSTRIAL ARTS TEACHERS OF WESTERN PENNSYLVANIA MEET.

The fall meetings of the Educational Association of Western Pennsylvania were held Friday and Saturday, December 1st and 2nd, at the Schenley High School, Pittsburgh, Pa.

At the Saturday session, the Industrial Arts Section listened to several interesting papers and discussions. The general topic for discussion was "The Citizenship Value of Industrial Arts as Seen From Various Points of View.

It was decided that the spring meeting should be held on March 24th.

The officers elected for the year were:

President, Charles E. Lawrence, Instructor in Mechanical Drawing, Schenley High School, Pittsburgh, Pa.; Vice-President, J. A. Miller, Director of Vocational Education, New Kensington, Pa.; Secretary-Treasurer, Edward L. Williams, Director of Vocational Education, Braddock, Pa.

Rhode Island Teachers Meet. The Rhode Island Association of Teachers of Drawing and Manual Arts meet monthly at Providence for the discussion of professional problems and for the advancement of their mutual educational interests. The first meeting of the year 1922-23 was held December 13 and Miss Amey Vernon of the Tynie Toy Shop was the speaker. Miss Vernon described in detail the "Creche" or Holy Night group and the figures which make up the group. The Association has the following program of addresses for the balance of the school year:

Mr. Anson Kent Cross of the Museum of Fine Arts, will demonstrate his drawing and painting on glass which he is putting before the public as a very successful method of teaching drawing.

Miss Buffum on Bookbinding.

Mr. McCarthy on Stained Glass.

Mr. Kneipp on Precious Stones.

Art needlework done by workers at Federal Hill House.

The Association will act as hostess at the Western Arts Association convention, May 3-4-5.—**Helen C. de Ballard.**

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Refinishing Old Mahogany Chair.

332. Q:—I have a mahogany chair some 75 years old which I wish to refinish. I have already removed the polish which was on it, but have not sandpapered it yet. There is a good deal of beading and spool work on the chair making a good many corners in which it is hard to work. There is a little veneer on the back but nowhere else. What I want is a dull finish which will show as much of the natural color and grain of the mahogany as possible.—A. F. A.

A:—After the old varnish has been thoroughly removed from the chair, it should be carefully and completely sanded with at least a 00 paper. Portions of beading and carving not accessible to the fingers should be cleaned out with a hard wood stick which has been sharpened to a round point on one end and a skew chisel on the other. For this class of work a cheap fiber nail brush such as is available at the ten cent stores is of great value when used on the dry state. From this point on, the finish may be secured in one of two ways. First, by the linseed oil method whereby the wood is treated once a month to a hot coat of raw linseed oil, two parts, turpentine, one part to each pint of which mixture is added one tablespoonful dark japan drier. Each coat should be allowed to stand over night and the following day all excess should be carefully rubbed in or off using considerable friction to induce a polish. This in time will produce an extremely thin but very durable finish which virtually becomes a part of the wood itself. It will lack, however, the brilliancy, depth, and transparency which can be better secured through the use of two coats of varnish following a sanding, a suitable colored water stain and a chocolate brown silex filler carefully rubbed in to the grain, cleaned off and allowed to dry forty-eight hours before being varnished. The first coat of varnish may be sanded or rubbed with curled hair but the second or third coat should be water rubbed with pumice stone and felt pad and then cleaned up with a good polish. As a matter of personal experience, I believe that some varnish at least to the extent of two or three coats is necessary to really bring out the true figure and tone qualities inherent with mahogany. To do less than this is to produce a fadish finish of which one soon tires. —Ralph G. Waring.

Pottery Troubles.

334. Q:—1. What would be some of the possible causes of the breaking of tiles in a bisk fire? 2. What would be the cause of breaking in the glaze fire after coming through the bisk fire O. K.? 3. What will help to keep small particles from the inside of the kiln falling in the glaze and setting with it? 4. Is overfiring the cause of checking in the glaze?—G.K.W.

A:—1. Too much weight on tiles, not compact which causes air pockets; remedy, rear on end. 2. No reason for breakage in second firing unless pieces contain dents or cracks in biscuit. 3. Brush off shelves, sides and top of kiln and apply thin wash of clear glaze. 4. No. Experienced in all low fired pottery on account of low fired body; remedy, use red burning clay.—Wm. W. Wilkins.

ARCHERY STRINGS.

338. Q:—We make quite a number of bows and arrows in our manual training shops but have trouble in procuring suitable strings. Where can we get strings for same? Is sinew string obtainable? If so, where and what would be the probable cost of same four feet long or longer.—A. D. P.

A:—These may be obtained from Hart Bros. Mfg. Co., Chicago, and Armour & Co., Tennis String Department, Chicago, Ill.

Soldering Zinc.

343: Q. Can you give me a reliable method of soldering zinc?—A. B. P.

A: The New Jersey Zinc Company recommends the following procedure:

1. The surfaces to be soldered should be carefully cleaned and all traces of grease, dirt, oxide, etc., removed.

2. The ordinary "cut acid" soldering flux used in soldering galvanized iron may be used. This is made by adding to muriatic acid a little more zinc (scrap pieces) than the acid will dissolve. If more convenient, muriatic acid may be used instead of the "cut acid" for a flux.

3. Ordinary "half and half" solder used with a moderately hot iron while the surfaces to be soldered are still moist with the flux has proved most satisfactory.

NEW BOOKS.

Teaching Apprentices in Printing Trades.

Cloth, 106 pages. Price $2.00 net. Published by the United Typothetae of America, Chicago, Ill.

The employing printers have felt the need for a manual for use of instructors in printing. The authors provide an intelligent discussion on the art of printing and the fundamentals in teaching the same. The manual also points out the vital differences between the trained and the untrained instructor.

It then digs into the questions of what to teach and how to teach and names the instruction devices, provides practical lessons, the grading or rating of students and how to excite interest and prompt efficiency.

Vacuum Tube Receivers.

By O. F. Heslar. Including 27"x36" Layout Print. Paper, 28 pages. Price 75 cents. National Radio Service, Indianapolis.

This book presents a very complete, fully illustrated series of directions for making a radio receiving set of the vacuum tube type. The directions include bills of materials, illustrations, and full instructions concerning the making of the cabinet, of wiring it, of installing and connecting the various parts and of putting up the antenna, etc. A glossary of radio terms, a list of broadcasting stations, a list of Morse Code Signals, and a large working drawing in the shape of a blueprint complete the booklet.

Drawing Course.

Charles Lederer and S. L. Smith. Eight groups, 30 lessons each. Price 32 cents. Hall & McCreary, Chicago.

This course comprises thirty lessons for each of the eight grades of the elementary schools. It is of the loose leaf type, arranged in envelopes, with instructions to the teacher and a supply of drawing paper.

Rapid Arithmetic.

T. O'Connor Sloane. Cloth, Octavo, 190 pages. Price, $1.50. D. Van Nostrand Co., New York, N. Y.

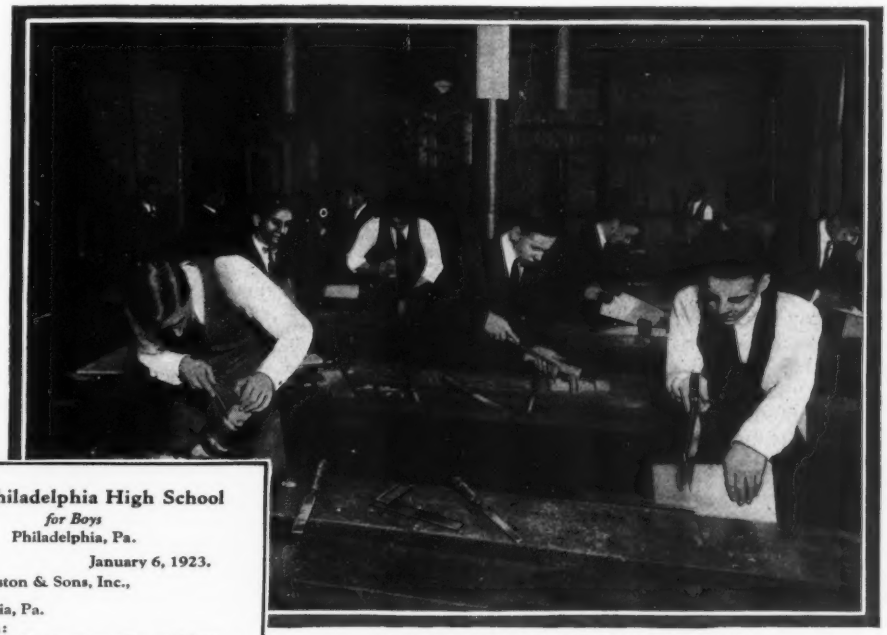
An arithmetic with human interest is a rare type of book. True our best elementary texts now have a close relation to child interests and activities and to later everyday life. But it is a rare book indeed that is not of the single track, one method type or that departs so far from the conventional as to include the multiplication tables above twelve. Very few authors and teachers have learned the peculiarities of numbers, those oddities which lift them out of the humdrum rigidity of two and two make four.

The present book assumes that the reader possesses the mastery of the ordinary principles and that he is seeking quicker or easier methods of manipulating the four fundamental operations. It presents a wide variety of sound arithmetical information and a large number of short cuts, variations of common operations and quick proofs. The arrangement is logical and carefully graded. A small amount of historical information and an interesting group of number tricks and jokes are included. The whole work is written in an informal, informational style that adds to the interest and enjoyment of an otherwise very dry subject.

PUBLICATIONS OF INTEREST.

Vocational Education: What It is, What It Does, and What It Needs. Issued by the State Board for Vocational Education, Austin, Tex. Describes the character of work done by the students in day-trade, part-time, and evening school Smith-Hughes classes under the direction of special instructors. Among the subjects treated are vocational home economics, vocational agriculture, trade and industrial education.

Better Work



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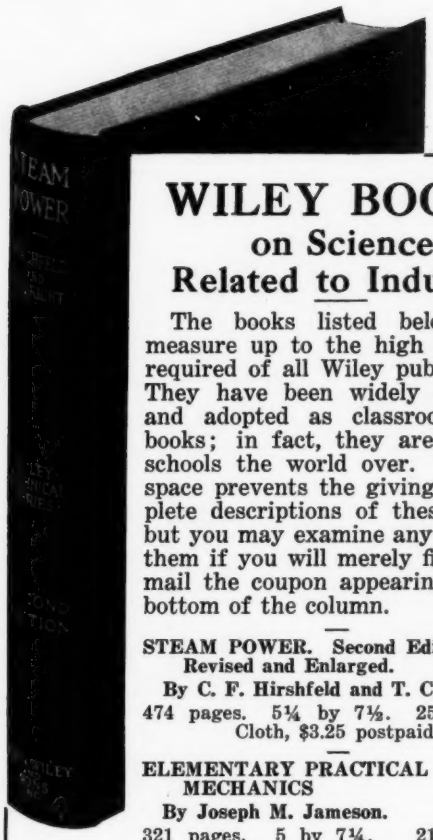

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NEWS AND NOTES.

Manual Training Club. A manual training club has been formed by the boys of the fifth, sixth, seventh and eighth grades of the Kishwaukee School, Rockford, Ill. Members of the club must have grades above "G" in manual training and mechanical drawing. There are no dues for membership but the boys pay for material used and they make whatever article they desire. The work is under the direction of Mr. Oscar Anderson, manual training instructor.

Oklahoma Vocational Meeting. The Oklahoma Society for vocational Education will hold its annual meeting in connection with the State Educational Association, to be held at Oklahoma City from February 8th to 9th. The department will have a large part in the program of the convention and will offer some interesting phases of work for the benefit of those interested in vocational education.

Home Nursing Course. A course in home nursing and hygiene has been added to the work at Monrovia, Calif. A vocational advisor has been employed to conduct intelligence tests and to gather statistical data for the use of the schools.

Pottery School. A school for the teaching of decorative work on China ware has been conducted at the Sebring Pottery Company's plant at Sebring, O. The school is intended for the training of prospective workers in the plant and replaces the former apprentice plan under which the worker was placed at a bench and started out in a haphazard manner. It is planned to utilize immediately those who have completed their training.

Evening Vocational Courses. The free evening vocational school at Wilmington, Del., is offering courses in machine shop practice, stationery engineering, sheet metal work, pattern making, electricity, mechanical drawing, architectural drawing, home economics and millinery.

Students Build Bungalow. The students of the Citizens' Committee free trade school, at Chicago, have recently completed the erection of a one-room bungalow to be used by the Citizens' Committee as an office. The entire work of erection, trimming, decorating and roofing was done by the students. The boys had had no previous practical experience in the work but carried out all the details of the building under the supervision of expert instructors. The school at present has four apprentice classes in training, each averaging ten pupils. They are given two weeks of intensive training and are then assigned to contractors for practical work with pay. These report once a week for additional instruction and other groups of ten are again started.

The school has also organized a class in plastering. The boys who enter this trade will not find a crowded field, for the reason that there are fewer plasterers today than there were ten years ago, while the demand has increased because of the use of stucco for outside covering of houses. The entire educational work is in charge of Mr. C. L. Bailey.

Tennessee Leads in Vocational Work. The sixth annual report of the Federal Board for Vocational Education shows that Tennessee ranks fourth in the number of agricultural departments, third in the number of pupils taking agriculture, and first in project earnings. Of the states reporting project returns, Ohio and Massachusetts outrank Tennessee, thus giving the southern state third place in project returns for the United States. Tennessee had 65 schools, with an enrollment of 2,762 students and project earnings of $75,949.

An Exhibition of Industrial Art. The seventh exhibition of American industrial art, representing the results of a study of the collections in the Metropolitan Museum of Art, was held January 14 to February 28, at the Museum Galleries. The exhibit represented a selection of the current work of manufacturers and designers who have regularly made use of the museum's collection in producing objects and designs for the trade. These products of the manufacturers owe their conception or method of execution, their color or contour, their detail, finish or characteristic of design to a study of the collections and the use of the educational facilities of the museum. The purpose of the exhibit was to demonstrate by means of a limited number of worthy pieces, the contention that the museum material has a positive laboratory function to serve and practical facilities to offer toward the production of current industrial art.

Vocational Education in the South. The development of vocational training in the public schools of the south,

(Continued on Page XXIV)

A PRACTICAL
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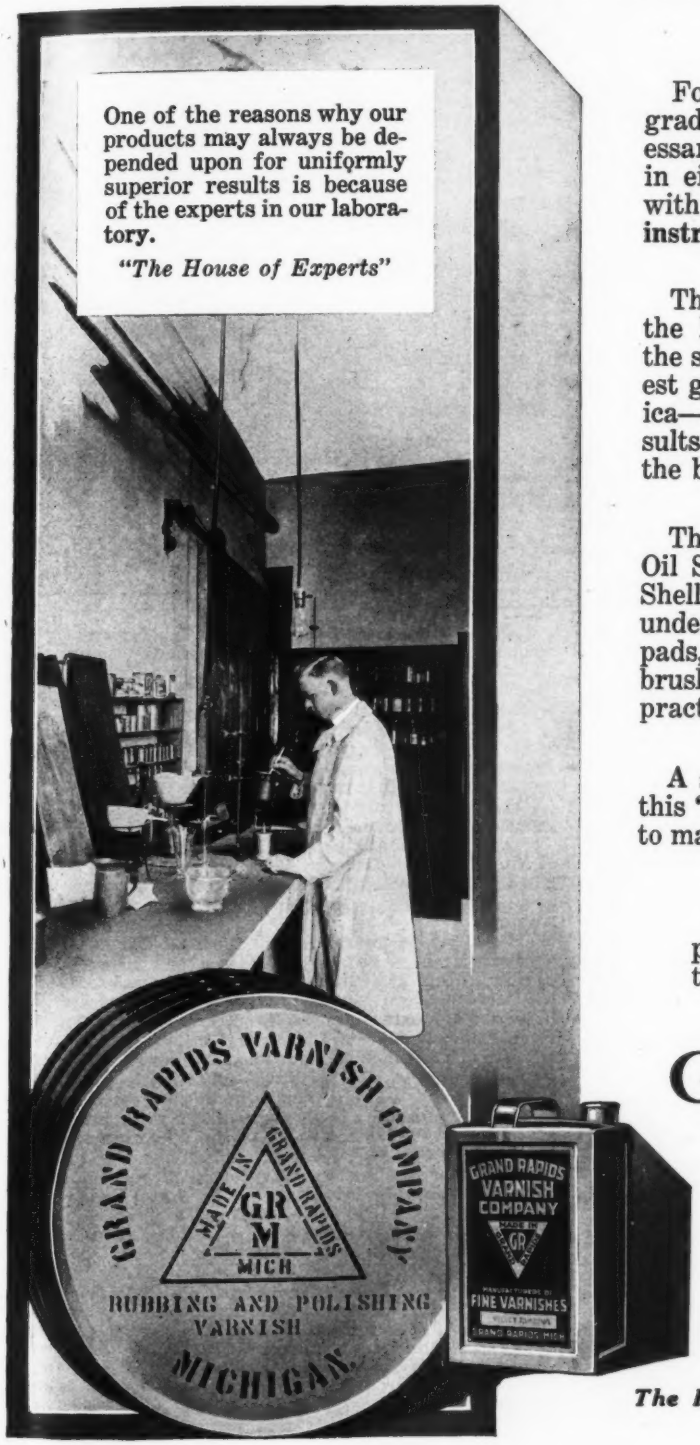
For Manual Training Schools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(Continued from Page XXII)

with particular emphasis upon agriculture and home economics, was the principal theme for the regional conference held at Richmond, Va., during the week of January 8th. The conference attracted delegates from twelve southern states who met under the direction of the Federal Board of Vocational Education.

A joint session of agriculture and home economics was held with consideration given to the question of cooperation of the two forces in an effort for mutual helpfulness. Training in child care, home making and negro education were three of the most important subjects listed for consideration of the women delegates. General discussion of health work and state programs for improvement of home conditions, especially in the rural communities, featured the conference.

Need Trained Workers in the Trades. Mr. L. A. Wilson, State Director of Vocational Education for New York State, in a recent talk on the subject of industrial education, declared the factories of the country are at present lacking in trained and skilled industrial workers, and explained the efforts which the state is making to meet the condition. Mr. Wilson pointed out that in 1890 only half of the immigrants were illiterate and practically all were skilled artisans. Now 78 per cent are unskilled and 36 per cent are illiterate. In the past ten years the number of bricklayers has fallen off by 10,000 and the number of carpenters by 1,000.

Mr. Wilson emphasized that training for the shop alone is not sufficient but that this must be supplemented by drawing, blue print reading and estimating. He declared the school authorities are willing to accept suggestions from industrial men and will cheerfully cooperate with them in promoting those plans and agencies which will improve the industrial situation.

Trade School Open House. More than 3,000 Chicago contractors received invitations to an open house at the Free Trade School, conducted by the Citizens' Committee to Enforce the Landis Award. On Tuesday, January 23rd, the classes in bricklaying, sheet metal work, carpentry, plumbing, painting and decorating were in full operation.

Open Additional Shop. With the opening of the second semester at Alton, Ill., an additional shop was installed at the Garfield School to accommodate the increased enrollment of the high school. Three classes are accommodated in the new shop.

Seek Fund for Industrial Art. A campaign has been begun at Chicago for the raising of $100,000 for developing American talent and encouraging American industry in the industrial arts. It is the purpose of the promoters to utilize the Art Institute as the training school for the preparation of skilled artists in industrial art.

Ask More Trade Courses. Thomas Bjorge, Director of Vocational Education at Rockford, Ill., has urged more thorough and better vocational training. A request has been made for the inauguration of a course in automotive training.

Vocational Courses. The Vocational Evening School at Denver, Colo., has opened the second semester with courses in clay modeling, commercial illustration, mechanical drawing, architectural drawing and business law. Special trade extension courses in art, book binding and foremanship training are also offered.

Urge Extension of Vocational Training. The extension of vocational and industrial education to all parts of Wisconsin, and a unified campaign to impress the people of the state with the importance of the work were urged at the recent annual conference of the Wisconsin educators held in December at Milwaukee. Among the educators who addressed the meeting were Mr. George P. Hambrecht, Director of Vocational Education for the State; R. L. Cooley, Director of the Milwaukee Continuation Schools; Ernest W. Schulz, president of the State Vocational Board, and E. A. Fitzpatrick, Secretary of the State Board of Education.

Advisors for High School Work. A high school vocational advisory committee, made up of local employers and employes, is planned by F. R. Love, head of the vocational department at Stockton, Calif. The purpose of the committee is to connect the trade work in the high school with local industries so as to make the training more efficient for the boy and also for the trade employer. The school

(Continued on Page XXVII)

A general view of the Printing Department of the Seymour Vocational School, Newark, N. J.

The Kelly Automatic Press, a machine that produces the finest kind of printing at a speed of 3,500 impressions per hour.

Printing + Interest = Education

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Boys, the sizes and ages shown, are not interested in a subject that doesn't appeal to them. Printing fascinates most boys. It teaches them the use of punctuation marks, the making of proper margins, the use of good English, correct spelling, capitalization, and indention in an accurate manner.

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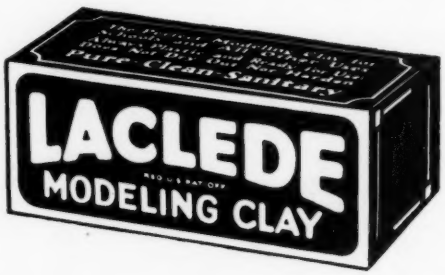

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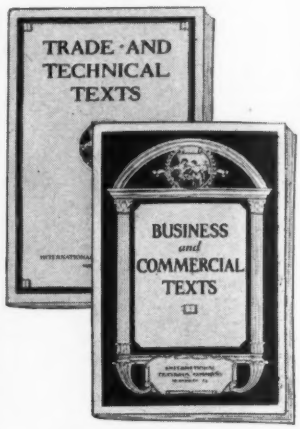

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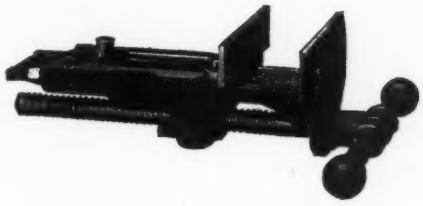


Here is the most widely used and generally useful manual training school vise built — the Columbian Type 1-C. Yet it is only one of the many different models which will be of interest to supervisors of vocational training schools. The new Columbian catalog shows the complete line of vises and anvils. Your copy is ready.

The Columbian Hardware Company

World's largest makers of Vises and Anvils

Cleveland, Ohio.

(Continued from Page XXIV)

maintains a junior employment bureau for the placing of graduates but it is believed that closer cooperation with the employers in the trades will result under the new plan.

Reorganization in Indiana. The state vocational department of Indiana is to be reorganized in accordance with the recommendations of the Educational survey commission. The work formerly carried on by Mr. E. A. Wreidt, is to be combined with that of some other state department, in the interest of economy and the correlation of the work with other divisions of the State Education Department. In dispensing with the services of Mr Wreidt, the state superintendent pointed out there was no friction between the vocational director and the other officials and that good work had been accomplished even under the limitations imposed by the present state law. It is probable that Mr. Z. M. Smith, state supervisor of agricultural education, will be asked to take on this work in addition to his duties as director of agricultural education. The elimination of the position of director of vocational director is expected to reduce the overhead expense by $5,000.

Commends Trade Training. Secretary of Labor Davis, in a recent address at Sharon, Pa., criticized the educational system of the country for its pursuit of the theoretical to the exclusion of the practical training in life. He pointed to the crowding of the "white collar" jobs and the serious lack of trained craftsmen and artisans in those fields where lie the greatest opportunities and the higher wages. He pleaded for the restoration of the dignity of labor by teaching the trades in the public schools.

Christmas School Magazines. The office of the INDUSTRIAL-ARTS MAGAZINE is in receipt of three most interesting Christmas numbers of school magazines produced in school print shops.

The producer which is the magazine of the Boys' Vocational School, Atlantic City. Aside from the interesting reflection which it gives of school activities, the teacher of printing will appreciate the unusually fine page layouts and the careful press work.

An original linoleum print cover in three colors distinguishes the Christmas number in the Tattler published by the McKinley Alternating School, Newark, N. J.

The Vocational Messenger of Albany, N. Y., widely known throughout the United States for the valuable information which it gives concerning all the Albany vocational schools. The Christmas issue has a most cheerful front page in three colors.

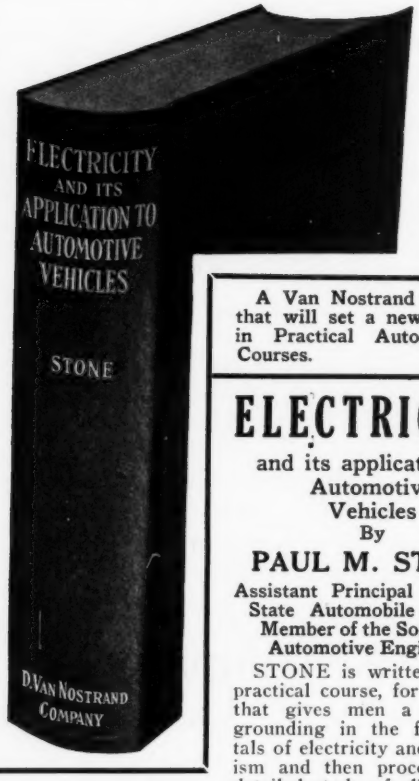
Painting and Decorating. A class in painting and decorating has been established in the Murray Hill Vocational School. The course which is two years in length, is conducted by the Department of Education in cooperation with the Association of Master Painters and Decorators, the Contracting Painters and Decorators' Association, the Interior Decorators, and the Brotherhood of Painters, Decorators, and Paperhangers of America. The graduates are allowed one year off the regular apprentice period of four years, and enter the trades as advanced apprentices. Eighty pupils have been enrolled for the evening course.

Printing Problems. The printing classes of the Burritt Junior High School, at New Britain, Conn., under the direction of Mr. James Robinson, instructor, printed a number of very neat Christmas cards. The cards were printed in red and green and proved very attractive for the holiday season. The printing department also has charge of the printing of the "Burrittian" the school paper issued by the students of the Burritt Junior High School. The paper which contains eight pages of reading matter is attractively arranged and well printed.

Lamp Shade Competition. The Art Alliance of America, New York City, is sponsoring a prize competition for the design of lamp shades and bases, to be held during February. The contest which closes February 15th, offers prizes of $300, $200, and $100 for the best complete designs of lamp shade and base. Three additional prizes of $100 each will be awarded by the jury for meritorious designs.

The competition has for its purpose the development of a lamp of beauty and utility, which will be harmonious in the home, and which may be reproduced at a cost within easy reach of the person of average means.

Prize designs will become the property of the Decorative Arts League and widespread publicity will be given to



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STONE is written for the practical course, for the class that gives men a thorough grounding in the fundamentals of electricity and magnetism and then proceeds to a detailed study of all types of electrical equipment of automobiles.

The book was developed during years of teaching of the subject at the Michigan State Auto School and other schools. Every chapter was submitted to the test of actual classroom use and nothing is included which is not considered vitally essential to a perfect knowledge of this subject.

An important feature of the book is its extremely simple mode of presentation. The mental viewpoint of the student is always before the author and he makes frequent use of repetition where necessary for emphasis.

The practical mechanic as well as the student will appreciate and find valuable, the easy-to-read descriptions and clear cut illustrations of every type of electrical equipment for automobiles, trucks and tractors.

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the design selected for production and to the author of the design.

Propose Central Trade School. The school board of Minneapolis has adopted a resolution looking toward the erection of a central trade or technical school for vocational training in the near future. In the meantime it is planned to limit the equipment and facilities of the so-called cosmopolitan schools as far as technical training is concerned.

Smith-Hughes Evening School. Under the supervision of Mr. H. P. Gerber of the Northern Normal and Industrial School, the first Smith-Hughes Evening School was opened on November 20th at Aberdeen, S. D. The school is conducted under the provisions of the Smith-Hughes law and is free to all students over 16 years of age.

The class in telegraphy had the largest number of students and without doubt was the most enthusiastic and industrious. The greater number of the students not only study during the regular school nights but have their own telegraph sets which they operate at home during their leisure hours. The students are divided into small groups and are thus able to get instruction both in sending and receiving messages.

In the automobile mechanics department there is a class of ten students dissecting automobiles and correcting their ailments. Special attention is given to lighting and starting units as these are important parts in modern cars.

The students in the architectural drawing class make practical application of the learning to which the country has advanced. The classwork is divided into two parts, the first for beginners and the other for the more advanced students. The beginners class takes care of young boys who aspire to this work, while the advanced class enrolls men of mature years and extended practical experience. In the last division will be found men who are engaged during the day as carpenters, sash and door men, mill workers and brick masons. These workers by taking the course offered in the evening school advance themselves to foremen, contractors, superintendents and estimators.

The art and needlework class takes up the making of dresses and suits, fancy embroidery, flower making from scraps of material and from yarn for dress trimming.

The machine shop class has eight students with a waiting list of those who desire to enroll. Those taking the course are employed as mechanics in garages and shops of the city and who expect to obtain considerable profit from the work. The instruction consists mainly of reading blueprints, making tools, and learning the principle processes involved in the work.

There is a department of dressmaking where the women and girls receive instruction in the making of garments for the family, or the fashioning of a piece of fine needlework.

The class in millinery which has proven quite popular, is divided into two groups, each of which receives instruction for the period of one hour. The students are taught the art of making buckram shapes, the covering of the shape, renovating, and the making of flowers.

The class in sheet metal drafting has enrolled nine students, five of whom are giving attention to mechanical drawing. The students have made a number of very fine drawings for classwork.

Industrial Films. The ninth grade of the technical division at Wellesley Hills, Mass., has enjoyed an exhibition of industrial films, given weekly for the benefit of the industrial classes. Among the films shown were the Baldwin Locomotive Works, Plymouth Cordage Co., General Electric Co., Chase and Sanborn Coffee Co., and others provided through the assistance of the Pathescope Company.

Mr. H. H. Coburn, who acts as director of the work in industrial arts, has introduced the "line and staff" method of shop control. All work is given through detail routing and process cards, making it possible to direct larger groups of boys. Classes are passed between academic and shop buildings in military order, with the aid of boy captains and lieutenants.

Vocational Schools Dedicated. Two new rural community vocational schools were recently dedicated in the vicinity of Harrisburg, Pa. The first was the Paxton school located in Dauphin County and the second was the South Middleton school in Cumberland County.

Art in Fire Prevention Campaign. The children in the art classes of the state of Pennsylvania recently made striking posters in the interest of fire prevention. The

(Continued on Page XXXI)

GOOD TASTE

One source of happiness your child can never lose

How school art is helping him attain it

THERE is nothing of greater practical value to your child than good taste. And once gained it is a source of happiness he will never lose.

The clothes he wears, the home he builds and every object of use which he gathers about him will go far toward determining men's judgment of him.

In his business it can be made an active selling force. It will give beauty and effectiveness to his retail windows and counters, and its skillful touch will lend power to the letters he writes.

The important quality, good taste, is only partly instinctive in your child. Its development and guidance have become one of the most vital problems facing the men and women in the schools today. And they are solving it through school art.

How your child is attaining it

The boy and girl in school today are not merely drawing landscapes, as you did years ago. From the time they enter school they must construct and criticize and reject. They must design posters, book covers, advertisements, wearing apparel and interiors.

They learn color, form and arrangement. Gradually, through constant comparison of their work with known standards, there grows in them an unerring sense of values, a knowledge of color and design. And as this perception increases, a new confidence is developed, and a new power to apply that knowledge.

If you are engaged in merchandising, discuss with your boy tonight a problem from your own business—the arrangement of a display window or the preparation of an advertisement.

If you are interested in manufacturing, discuss with him designs as applied to finished products. His answers may seem strange to you, yet behind it all you will begin to see that this great quality, good taste, is being developed. You will begin to see that now as never before school art bears vitally upon the business of the future.

And most important of all, school art is building in your child that force which is perhaps the greatest of human assets—creative imagination. "Imagination," Napoleon said, "rules the world."

Through observation, perception and careful deliberation he is absorbing impressions which he must quickly turn into expression. And in the future it is this ability to create, to express with good taste, which will make your child a leader in business and social life.

Give your active support

Though school art has made tremendous advance in the last ten years it is still struggling under the weight of public indifference. Without the active interest of every parent in your town this work cannot grow as it should.

For the good of your child and every other child in your community, you should examine your school art situation. And if there is no art work at all in the schools, you should urge the adoption of such courses and do all in your power to further these advancements.

THE AMERICAN CRAYON COMPANY - *Established 1835 - Sandusky, Ohio, and New York*

The world's largest makers of chalk, crayons and water colors

One of a new Series of American Crayon Company messages, to appear in the Saturday Evening Post.

Giving New Impetus to School Art

Above is reproduced in miniature a rough draft of one of a second and vital series of American Crayon Company messages to American parents.

The importance of this series to the future of school art cannot be over-estimated, for through it parents will be shown that this subject is now of significant and measurable value to their children.

The message above shows graphically how and why the new art, with its practical problems in design, has displaced the old impractical drawing of landscapes, books and teacups.

Thus parents who have been wont to shrug shoulders at school art cannot fail now to see in its new development a force which is working powerfully and definitely for their children's commercial and social success.

The indifference which many parents have expressed for this subject has been largely due to their misunderstanding of its new purpose. They have judged the present art in the light of their own drawing of ten or twenty years ago. But, when they do understand its very real significance, their active interest and support will quickly follow.

And so it is hoped that these articles, by bringing about stronger public cooperation, will give added impetus to school art and that its growth will be increasingly rapid throughout the country.

* * * * * *

Our new magazine, EVERYDAY ART, should come to fill an important place in this movement for a greater school art. It is a forum for the exchange of ideas, and designed to keep art directors, teachers, superintendents and school boards in touch with all that is newest and best in this subject. When you have any constructive ideas, send them to us. Also, write for the present issue, which will be sent to you free of charge.

THE AMERICAN CRAYON COMPANY

ESTABLISHED 1835

SANDUSKY · OHIO · · · · · · NEW YORK

SIMONDS SAWS

Expert mechanics and finest crucible steel make Simonds Saws the best that can be found. Whether it be Band, Circular or Hand Saws you require for the school shop, you will save money and get better results if you equip with Simonds.

Write for catalog and prices

Simonds Saw and Steel Co.

"The Saw Makers"

Fitchburg, Mass.
5 Factories

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12 Branches

Build Your Own PHONOGRAPH

One of the most interesting and instructive problems in Manual Training, one that will not fail to arouse the pupil's enthusiasm, is the building of a phonograph. It provides one of the best problems in advance cabinet making. It involves the elements of good design, requires accurate cabinet work, and offers an exceptional opportunity in wood finishing.

Manual Training Teachers: Let Your Pupils

Build a Choraleon Phonograph

We furnish plans, blueprints, motors, tone arms, case material,—in fact, everything required, including, full instructions. Choraleon Phonographs are unsurpassed in tone. They play any record.

Write Today for Our Free Blue Print Offer

CHORALEON PHONOGRAPH AND RADIO CO.
323 6th St.
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Save $12.00

Build this Radio Receiver and Detector

Complete price $25.00. All parts to assemble, except cabinet, $13.00. Blue prints of the following 25 cents each, or all for $1.25: Crystal Detector Receiver, Audion Detector, Non-Regenerative Receiver, Regenerative Receiver, 2-step Audio Amplifier, Radio Amplifier. Catalog free.

Tribune Airfone Company

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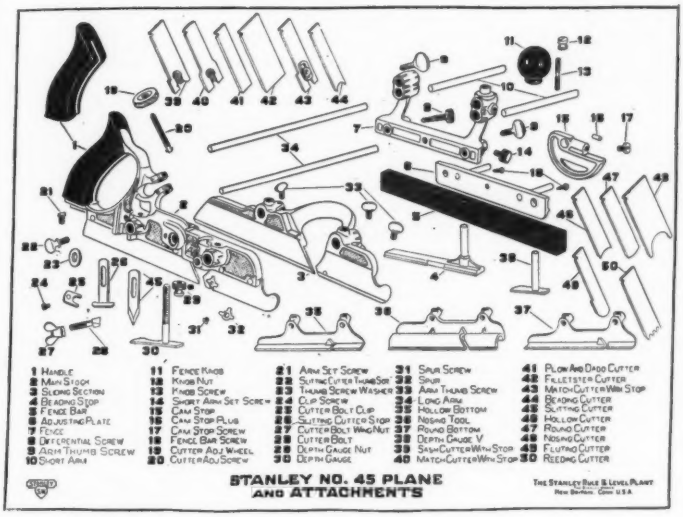
When explaining to your students



the proper method of handling various tools, and the names by which the parts of tools are known to the craft, your work will be much easier if you have the

STANLEY Complete Set of Tool Charts

The illustration shows the completeness and accuracy with which these charts have been prepared. We shall be glad to send the complete set, FREE, to any teacher of manual training requesting same. Ask for Chart Set, No. 16-C.

The Stanley Rule & Level Plant,

The Stanley Works
New Britain, Conn.

STANLEY S.W.

STANLEY

New York
Chicago
San Francisco
Los Angeles
Seattle

(Continued from Page XXVIII)

ideas were original and covered nearly every form of danger which could be imagined. The work had a two-fold effect, in that it attracted considerable attention to the art work and the fact that it impressed the subject on the minds of the students.

Continuation Activities in Philadelphia. Part of the $15,000,000 building program proposed for Philadelphia includes the building of a continuation school to replace the John S. Hart School in the industrial section of the city. This building will be designed and equipped for 3,500 students and will be the first school built for the definite purpose of housing continuation pupils.

Home Making Course. A well-rounded course in home making, including sewing, cooking, laundering, home care of the sick, design, home planning and furnishing is offered to freshmen girls in the high school at Bellfonte, Pa. Cards are used for home projects, which are scored by the mothers of the pupils as each piece of work is done satisfactorily at home. Products of the classes in design, cooking and sewing were sold at the Christmas bazaar.

Home Management Classes. The continuation classes in home management at Bethlehem, Pa., meet regularly in the housekeeping suite in which home economics classes are held. The suite is used as a basis for teaching the continuation classes the planning of rooms, the selection and placing of furnishings, and the care of furnishings. In the clothing classes, the choice and care of clothing rather than construction, is emphasized. Garments loaned by local merchants form the basis of discussion. These are criticized by class members on such points as line, color, ornamentation, fabric, durability, cost and possibilities for renovation.

Teacher-Training Class. The vocational teacher-training extension class at Bethlehem, Pa., under the direction of Mr. James C. Tucker, director of vocational education, is taking the work of trade drafting in a unique way. The membership of the class, consisting of twenty, is made up of draftsmen, machinists, electricians, patternmakers, carpenters, structural engineers and related subjects teachers. The class is organized on the plan of an industrial drafting room and the instructor acts in the capacity of chief draftsman. Men with more experience are assigned designing projects, while those with less experience are assigned projects from the designs of the more advanced draftsmen.

Practical School Work. Since the opening of school in September, the print shop at Erie, Pa., has turned out one hundred jobs with a commercial value of about $700. Four school papers were printed during this period.

The students of the carpentry class have finished a number of tables for the laboratory and drawing rooms, and are now constructing a bungalow.

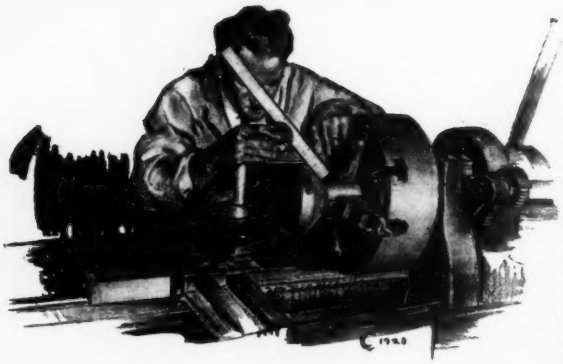
New equipment for the electrical shop has been purchased at a considerable saving of money. The students have constructed a switchboard which serves as a central station for the shop.

Evening Courses. Vocational evening school opportunities at Johnstown, Pa., embrace machine shop practice, printing and linotype practice, blue print reading, mining, mechanical drawing, plumbing, and show card writing. The plumbing class organized upon the expressed wish of the Master Plumbers' Association, is conducted under the direction of the city plumbing inspector. Mining classes have been successfully conducted for several years. With the cooperation of the local coal operators, a double class of sixty is preparing for the examinations next April for fire-boss and mine foreman.

Improvements in Shop. A new lathe, drill press, power press, forge and vulcanizing machine have been installed in the industrial department of the high school at Lock Haven, Pa. The machines are driven by individual motors. A full complement of tools has been provided for the automobile repair department.

Open New Courses. Battery testing and repair and tire vulcanizing are two new subjects taught in the Automotive Trade Schools of Cincinnati. One of the new night classes follow in general a type of work which has been offered in the day schools with great success. The work is under the general supervision of Mr. Ray F. Kuns, head of the school.

In a recent campaign under the title of "America's Making," the high school art classes of New York City prepared a number of strong posters which were used in



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The Starrett test is the final check on accuracy. On all kinds of work in all kinds of shops Starrett Tools have served machinists well for over forty years.

Have you sent for your copy of the Supplement to Catalog No. 22CE describing the latest Starrett Tools?

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The World's Greatest Toolmakers
Manufacturers of Hacksaws unexcelled
ATHOL, MASS.

STARRETT BEVEL PROTRACTOR No. 490

(With Hardened Blade and Reversible Head)

Notice that the turret is graduated to read both ways from 0 to 180 degrees giving direct readings and the supplement of the angle as well as the angle required. No chance for confusion as to whether angle obtained is acute or obtuse—there is but one zero line on the frame.

Use Starrett Tools

4927

illustrating the essential features of the campaign. The posters proved so attractive that they have been in constant demand since the campaign and the State Education Department has requested one hundred posters as aids in a similar campaign to be put on in New York State. The posters, it is found, have been employed by the art department, by the department of immigrant education and were also exhibited at the Boston meeting of the N. E. A. The posters have been favorably received because of their insight into the purpose of the festival and the character and strength of their execution. At present the posters are on exhibition in Richmond, Va., in connection with the Virginia Teachers' meeting. They will be shown upon their return at conferences of art teachers throughout the state.

NEW TRADE PRODUCTS.

Oliver Speed Lathe. The Oliver Machinery Company, manufacturers of the first woodworking machines of the motorized type, have just put on the market a new motor head speed lathe of the direct current type. The Oliver No. 51 adjustable speed motor head lathe is a distinct step forward in the development of better and more direct motorized wood working machinery.

The Oliver speed lathe is a variable speed motor operating at any speed between 600 and 3600 R. P. M. It operates from single, two or three phase lines, making the alternating current motor head lathe just as flexible as the direct current lathe. The controlling mechanism is self-contained in the motor and the speed of the motor may be varied at will while the motor is running.

The motor head lathe has all the advantages of direct motor driven machines, namely, increased efficiency, increased safety, elimination of belts, more simple mechanism, and better arrangement on the floor without regard to line shafts. The lathe has been sold in large numbers for use in school shops where equipment of this character is especially desirable.

Information concerning the Oliver speed lathe may be obtained by addressing the firm at Grand Rapids, Mich.

Prizes for Essays. The American Woodworking Machine Company has offered $10,000 in prizes both cash and articles of value to teachers for suggestions concerning cabinetmaking and woodworking. The firm is anxious to learn and to put at the disposal of teachers, the best thoughts of all American teachers and supervisors on the organization, purpose and teachers, methods of the departments which are listed under the general head of woodworking. Whatever is being done in the direction of developing the woodworking subjects whether these be classified as manual training, cabinetmaking, patternmaking, wood turning, etc., to serve as a cultural subject, is of interest to the firm. Every essay considered acceptable by the firm will be paid for by means of a prize or a cash award. The board of judges consisting of three men high in the vocational education field will judge all entries.

Grand Rapids Concerns Consolidate.—The Union Machine Company has been consolidated with the Grand Rapids Grinding Machine Company and the Valley City Machine Works all of Grand Rapids, under the name of Gallmeyers & Livingston Company. The products of the three companies will continue to be manufactured by the new concern. A new factory that will house the consolidated concern is now under construction.

PERSONAL NEWS.

Mr. S. C. Sonnichsen, professor of economics at the University of Des Moines, Des Moines, Ia., has been appointed Director of Vocational Education for the state.

Mr. H. H. Coburn has returned to accept the position of Director of Industrial Arts at Wellesley Hills, Mass.

Mr. R. L. Stephenson, formerly at Wellesley Hills, Mass., has accepted a position in an architect's office.

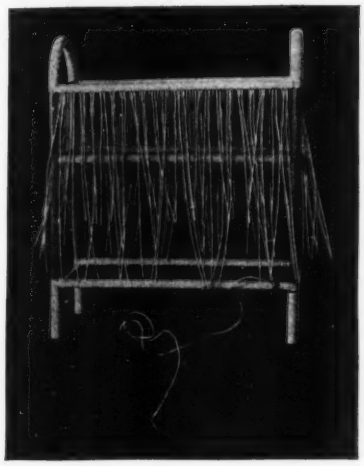
Mr. Carleton C. McCall, for many years a teacher in the Manual Training High School of New York City, and in the Brooklyn Technical High School, died on January 9th.

Mr. McCall upon completion of his elementary education, took up the study of manual arts at Mechanics Institute, Rochester, N. Y. He was graduated from Pratt Institute, Brooklyn, in 1894. Affter leaving Pratt, he acted as supervisor of drawing and mechanical arts in the public schools of Harrisburg. With the exception of a few months in the Technical High School of Scranton, he remained in Harrisburg until he accepted the position in the New York City Schools. Mr. McCall joined the faculty of the Manual Training High School in New York City in February, 1905, and later moved to the Technical High School when it was organized last September.

TRADE MARK

ART-FIBRE WEAVING

MANUAL TRAINING, VOCATIONAL AND SPECIAL INSTRUCTORS



We will furnish full and complete detailed instructions for weaving and finishing with each order for this project. Write us today and start enjoying this fascinating art. You will like it.

Weaving this decorative fernery from Art-Fibre products is a treat that you and your students will enjoy immensely.

Just visualize for a moment the possibilities for constructive education, for pleasure and clean enjoyment that this fascinating art offers to you and your students. Frame assembling, furniture weaving, finishing, decorating, electric wiring, and upholstering are all touched upon as you progress.

This keenly interesting art is just a step beyond basketry, the same fundamental principles apply, **but** the results obtained are far greater and more remunerative.

You may choose from over fifty beautiful Art-Fibre designs, starting with the more simple and following through to the most difficult. Each successive step in their development will bring a greater degree of pleasure and, of course, many charming pieces of furniture for the home.

FERNERY No. 60

You can weave this fernery. Order it today. We will furnish full and complete instructions for weaving and finishing, together with all necessary materials which include the knocked down frame, Art-Fibre cord, Art-Fibre stakes, glue sizing, a high grade galvanized iron pan and finishing materials.

Varnish finish	$7.30
Enamel finish	7.85
Duo-Tone Enamel finish	8.15

Write for our Catalog of Designs. It is mailed free on request. Over fifty beautiful designs ranging from footstools to large and complete suites of furniture are clearly illustrated. Many beautiful lamps and ferneries are featured; write for your copy today.

GRAND RAPIDS FIBRE CORD COMPANY

GRAND RAPIDS, MICH.

Special Offer—A Guaranteed Pease Jack Knife Ruling Pen for $2.85—Ten Days Trial

Has a hinged upper blade which opens to a full 90 degrees as easily as a knife blade. No projections—only pen of its kind that retains the convenient form and shape of an ordinary ruling pen.

Can be cleaned without touching the set screw—adjustment for width of line preserved at all times. Shall we send you a Pease Jack Knife ruling pen—you to return the pen or remit $2.85 within ten days?

THE C. F. PEASE CO.

802 N. Franklin St., Chicago, Ill.

Blue Printing Machinery

Drafting Room Supplies

Drawing Instruments

Just send $2.85
You can keep the pen 10 days

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Department of Industrial Education Offers More Than 50 Courses for Degree or Certificate Credit.

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Foreman Training
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Furniture Design
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Machine I, II
Mechanical I, II
Mechanical Perspective
Printing Design
Projection
Sheet Metal
Cabinet Making, Elementary
Cabinet Making, Advanced
Electrical Construction
Electrical Machinery
Scout Leaders' Training Course
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DRAWING PENCIL
The Lead That Leads

The even grading in a high quality drawing pencil should be as accurate and uniform as the scales in music.

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ARE YOU AMBITIOUS?

SUPERVISION OF THE SPECIAL SUBJECTS

By L. S. Greene, Supervisor Industrial Education, Florida, Professor of Industrial Education, University of Florida.

This book will give those who are interested in becoming fitted for the Supervision of the Special Subjects, a survey of the duties and responsibilities they will popularly be expected to assume when they accept such a position.

It also will give such light on methods, ways and means as will be of real help in fitting a supervisor to satisfactorily discharge his duties.

Cloth, 162 pages. **Price, $1.35, net.**

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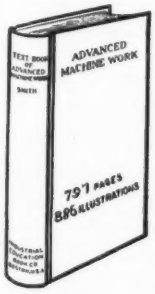
IN THE VANGUARD OF PROGRESS



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Seventh Edition, Revised and Enlarged.

By ROBERT H. SMITH
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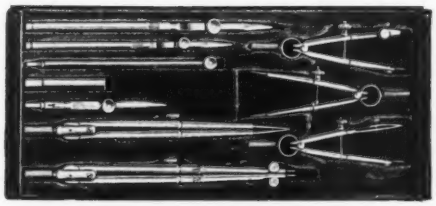

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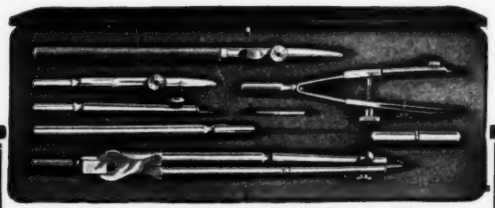

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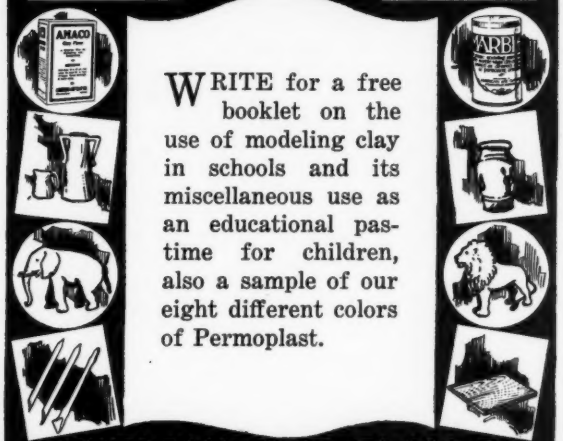

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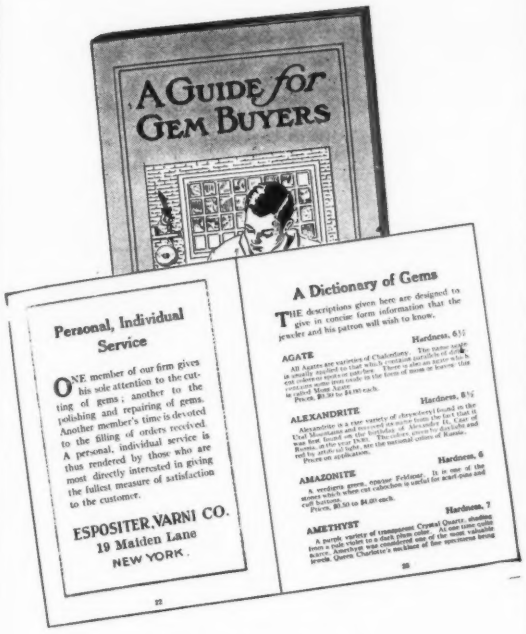
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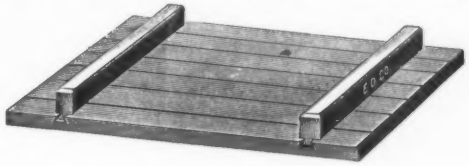

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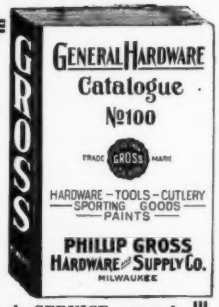

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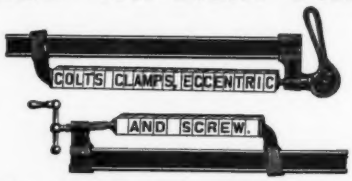

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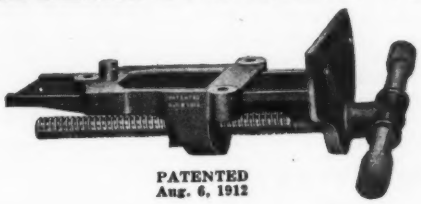

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Stanley Rule & Level Co.
Starrett Co., L. S.

STAINS
Grand Rapids Wood Finishing Co.
Johnson & Son, S. C.
Marietta Paint & Color Co.

STONES—PRECIOUS
Espositer, Varni Co.

THUMB NUTS
Williams Co., J. H.

TINSMITH'S TOOLS
Berger Bros. Co.
Niagara Machine & Tool Works

TOOLS
Atkins & Company, Inc., E. C.
Cincinnati Tool Company, The
Disston & Sons, Inc., Henry
Goodell-Pratt Company
Hammacher, Schlemmer & Co.
Greenfield Tap & Die Corp.
Millers Falls Company
Starrett Company, L. S.
Vaughan & Bushnell Mfg. Co.
Williams & Co., J. H.

TOOL GRINDERS
Atkins & Company, Inc., E. C.
Greenfield Tap & Die Corp.
Mummert-Dixon Co.
Oliver Machinery Co.

TOOL HOLDERS
Williams Co., J. H.

TYPE
American Type Founders
Barnhart Bros. & Spindler

UPHOLSTERING SUPPLIES
Dodge-Dickinson Co.
Cincinnati Tool Co., The
Rauch & Co., F. A.

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Grand Rapids Fibre Cord Co.
Grand Rapids Varnish Corp.
Johnson & Son, S. C.
Marietta Paint & Color Co.

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Bemis, A. L.
Goodell-Pratt Company
Millers Falls Company
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Abernathy Vise & Tool Co.
Columbian Hardware Company, The
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Oliver Machinery Co.
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Bradley Company, Milton
Binney & Smith Co.
Prang Company, The
Weber Company, F.

WAX
Prang Company, The

WAX CRAYONS
American Crayon Company
Bradley Company, Milton
Binney & Smith Co.
Dixon Crucible Co., Joseph
Weber Company, F.

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Reed Manufacturing Co., The

WEAVING MATERIALS
Grand Rapids Fibre Cord Co.

WOODWORKING MACHINERY
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Amer. Woodworking Mach. Co.
Black Brothers Co., The
Crescent Machine Company, The
Hall & Brown Wdwkg. Mach. Co
Gallmeyer & Livingston Company
Greenfield Tap & Die Corp.
Mattison Machine Works
Oliver Machinery Co.
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Tannewitz Works, The
Wallace & Co., J. D.

WOOD FINISHES
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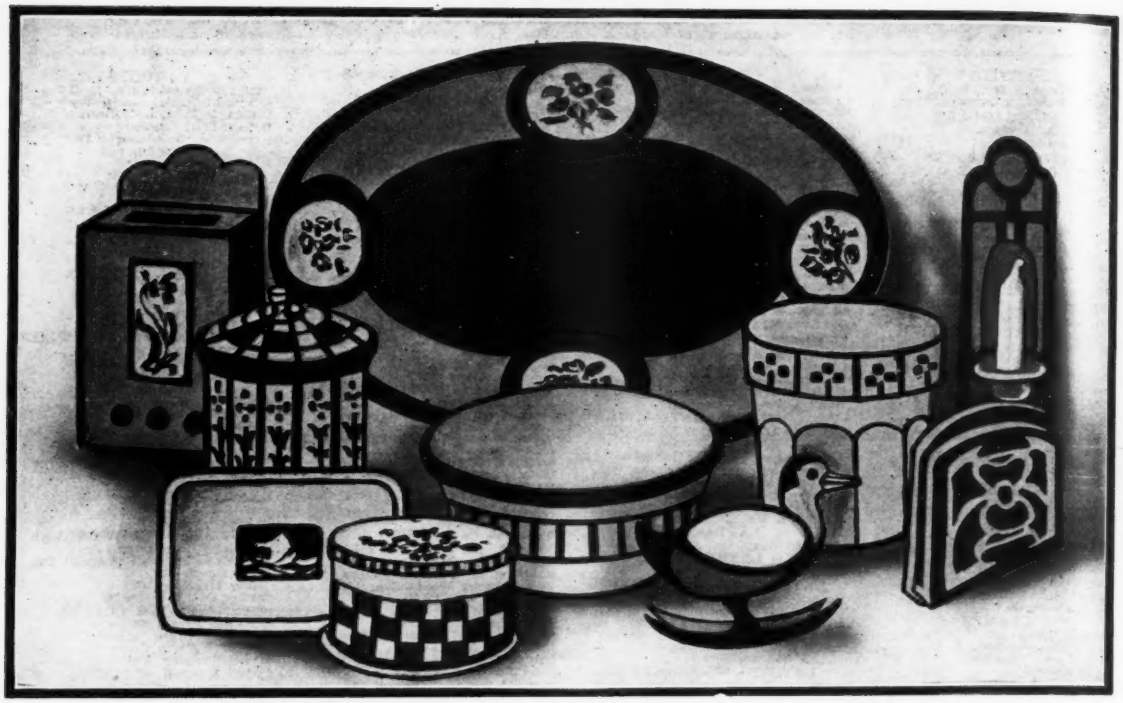

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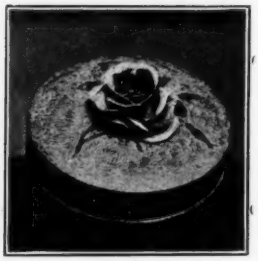

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Mr. Chester F. Connet, instructor of the Printing Department, tells the story of Printing in this School in a most convincing manner:

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The department now occupies a room eighteen by fifty feet on the ground floor. The composing equipment occupies the east half and the presses the west half of the room. Adjoining the large room on the west is a smaller room nine by eighteen feet used for a stock room and office. The rooms are excellently lighted and ventilated, which are two very important factors of a print shop.

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For many years manual training meant chiefly woodworking. The educators all over the country are realizing more and more that the nerve, eye and brain can benefit equally as much from setting and justifying a line of type as from sawing and planing a board. And aside from this the value of printing as to English, grammar, punctuation and mathematics is unlimited. Most school shops are largely, if not wholly, self supporting. These facts are demanding the attention of the public schools everywhere.

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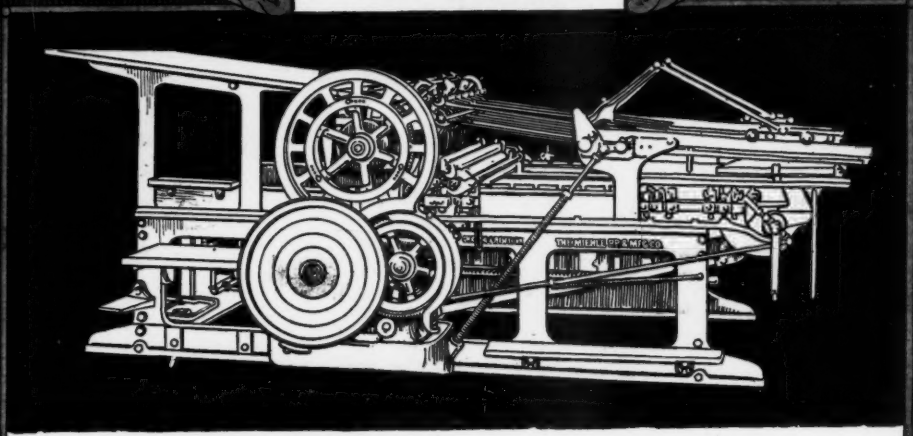

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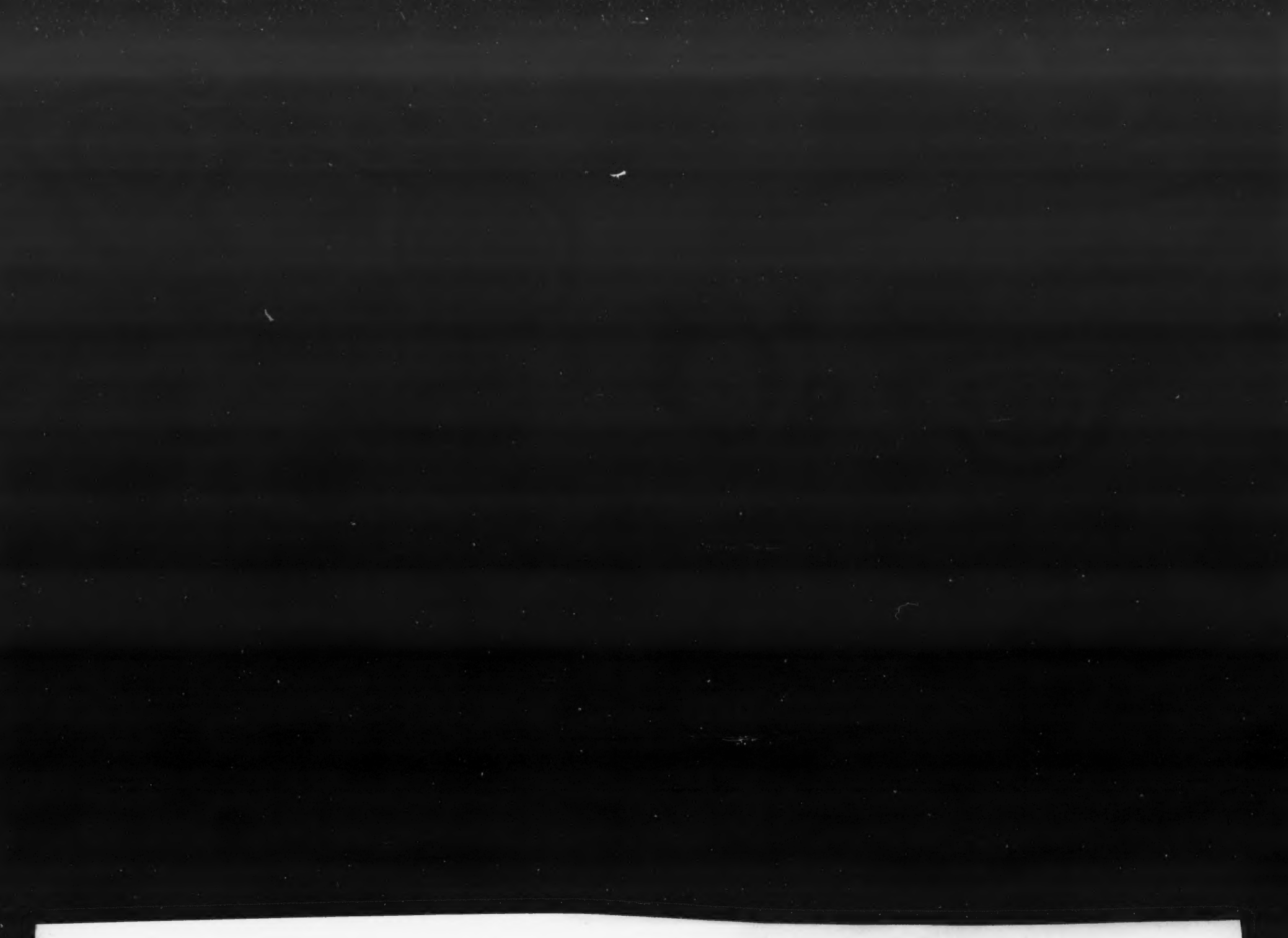
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